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ABSTRACT

This conference proceedings publication addresses issues in developmental education at the postsecondary level. Papers included are: "Developmental Studies Teachers to Retention Specialists: Assets, Not Liabilities" (Carol H. Bader); "Primary and Secondary Orientation Support for One Underrepresented Group" (Allen R. Barlow and Kerri Heavens); "Magazines in Developmental Writing: An Innovative Reading-Writing Connection" (Sandra Karnei Chumchal); "Summary of the Final Report of the American Mathematical Association of Two Year Colleges: Standards for Developmental and Introductory College Mathematics" (Betsy Darken); "Effects of Testing Methods on Outcomes in Developmental Algebra" (Jeanette W. Glover); "Breaking Down the Barriers" (Ellen Hendrix et al.); "A Fair Chance for All" (Trevor Hulme and Allen R. Barlow); "Academic Probation: A Road to Academic Success" (Marjorie L. Illingworth); "Arts Internships as Transition Space for Students At Risk" (Linda Adler Kassner and Terence Collins); "Tutor Training Enhanced By Knowledge of Tutee Expectations" (Joan L. Krabbe and Mark A. Krabbe); "Supplemental Instruction in Biology at the College Level" (Ofra N. Peled and Anna C. Kim); "Building Mathematical Understanding: From Counting to Chaos" (Patrick Perdew et al.); "Educating the Postsecondary Student with Learning Disabilities" (Linda Schnapp); "Integration of Basic Composition and Reading" (Caroline Stern); "Activities to Promote Achievement Among Mathematics Students" (Pamela V. Thomas and Jeanne L. Higbee); "Developing Experiential Learning Assignments for Composition Courses" (Edna M. Troiano); "Supplemental Instruction's Impact on Affect: A Follow-Up and Expansion" (Julia N. Visor et al.); "Mathematics Survival: A Linked Course" (Gideon L. Weinstein); and "Student's World: A Writing Assignment" (Annette C. Williams). (Individual papers contain references.) (NAV)

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Selected Conference Papers

Volume 1

# National Association for Developmental Education

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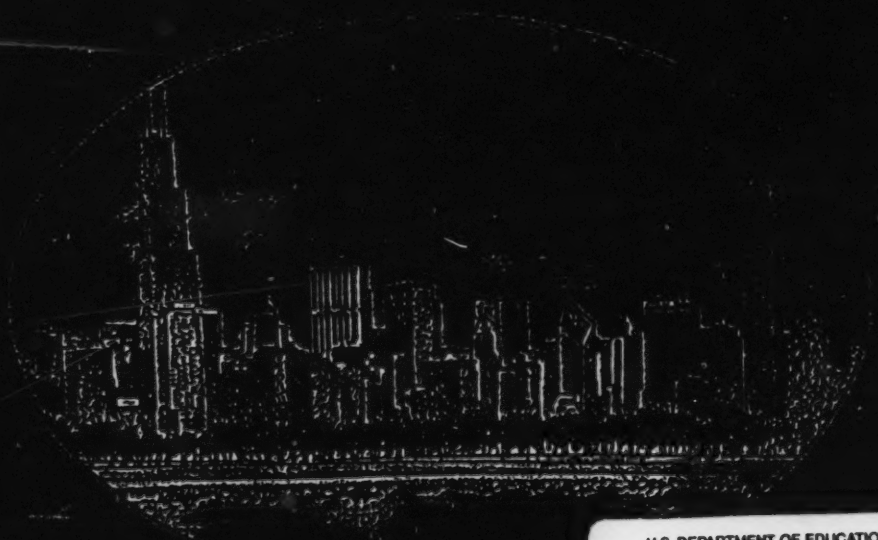

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*"Architects of the Future"*

February 22-25, 1995

Chicago, Illinois

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Selected Conference Papers

National Association for Developmental Education

Volume 1

Chicago, Illinois
February 22-26, 1995

Editors:
Jeanne L. Higbee and Patricia L. Dwinell
The University of Georgia

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# Developmental Studies Teachers to Retention Specialists: Assets, Not Liabilities

*Carol H. Bader*

## Abstract

*Information for changing perceptions of developmental educators from negatives to positives is discussed. Included in the information are (a) methods of demonstrating that developmental studies is cost effective, (b) ways to help educators to be perceived as scholars, and (c) strategies for pursuing awards and certifications.*

Often developmental educators are viewed as liabilities. We can change the perception from liabilities to assets if we are proactive in becoming "retention specialists." One of the primary tasks we must undertake is to convince our administrators, politicians, and the public that developmental education is cost effective.

First, we can be convincing by using statistical information. We must collect data that applies to our students. Such data would include the following: (a) retention data on students in developmental studies, (b) their graduation rates compared to students not in developmental education, (c) a profile of the developmental education student at the institution, and (d) data on how well developmental studies students do in college level courses compared with those students not in developmental studies.

Then we must take responsibility to disseminate the data. This information should be shared with as many interested people as feasible. A listing of possible candidates includes all developmental studies faculty and counselors, all institutional deans, vice-presidents, other directors of developmental studies within the state, the departmental publicity officer who is responsible for sending information to the public relations director, the departmental historian who keeps a scrapbook and takes pictures for the department each year, the university retention task force, state politicians, and state governing boards.

We must analyze and demonstrate that money spent in the developmental studies budget increases retention and ultimately becomes money invested, not wasted. In fact, at our institution for every dollar invested in developmental studies, approximately $10.30 is directly returned to the university in tuition and state generated funds. Effective developmental studies programs also benefit institutions in indirect ways. For example, our program employs approximately 50 student workers/peer tutors and 14 graduate students.

We must create ways to help developmental educators be perceived as scholars and full partners within the institution. It is incumbent upon the director to encourage the faculty to be professionally active. Developmental educators must meet a rigorous standard of professional involvement, including presentations and publications. Our department prints a "Year in Review" paper annually that highlights all the accomplishments within the department. Faculty members and counselors must keep detailed and accurate records of all presentations, publications, grants, workshops, in-services and other professional activities. Aggressive self-promotion is a necessity when faculty publish textbooks, develop in-house manuals, or earn higher degrees.

Developmental studies personnel have to be tenacious in looking for ways to serve the university and the community. Even though university committee service can sometimes be tedious, it offers a golden opportunity for developmental studies faculty to net-

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work university-wide. Volunteer to be the chairperson. It is in our best interest to attend those retirement dinners, awards ceremonies, and other functions outside our own departments. We should pursue advising student organizations, guest lecturing in other people's classes, teaching continuing education courses, and helping with the professional testing on campus.

Additionally, developmental educators must seek out grants for the department through university, state, and national sources. Our department has been successful in obtaining grants to bring in leaders such as Jane Jarrow, John Langan, Paul Nolting, Susan Mandel Glazer, and others. We have also been able to sponsor regional workshops on topics such as portfolio assessment, learning disabilities, math manipulatives, graphing calculators, personality type, adult learners, and the Americans with Disabilities Act.

Community service is another way to make developmental studies a viable component of the institution. We have had much success with the following community service projects: testing the eyes of elementary school children without telebinocular; creating a network with all high schools in the county for liaison purposes; presenting Attention Deficit Disorder workshops at local schools; speaking at local organizations (such as the county Gifted and Talented Parent Organization); presenting Americans with disabilities workshops to the community; creating workshops with the senior citizen homes for genealogical journal writing; donating books to nursing homes and adult literacy programs; volunteering with adult basic education programs; advising troubled teen groups; donating old equipment to public schools; and recycling old notebooks and folders to school systems. In short, take advantage of every public service opportunity that presents itself.

Third, developmental educators must continually apply for and earn awards and certifications. To begin this process, the developmental studies faculty must become very active in state developmental organizations, then national developmental organizations, and finally in the other related national organizations such as the International Reading Association (IRA), National Council of Teachers of English (NCTE), College Reading Association (CRA), National Academic Advising Association (NAAA), National Council of Teachers of Mathematics (NCTM), College Reading and Learning Association (CRLA), American College Personnel Association (ACPA), and the Association on Higher Education and Disability (AHEAD).

We can bring prestige and positive publicity to our departments by earning certifications and national awards. Some of the certifications that have helped our image include CRLA Tutor Certification, Kellogg Institute Certification, Professional Certification for Secretaries, and Laubach Literacy Certification. Awards that have elevated our position include the National Association for Developmental Education (NADE) John Champaigne Award and the IRA Exemplary Program Award. Other awards for which we are currently applying or plan to apply in the future include other NADE awards, the NACADA Outstanding Advising Office Award, the Noel-Levitz Retention Excellence Award, the American Association of University Administrators (AAUA) Outstanding Program Award, the Townsend Press Student Scholarship Contest, and the Townsend Press Reading/Writing Faculty Contest. Any time any award is given to the developmental studies area, it is worth much publicity and generation of good will.

In order to change perceptions, we as developmental educators should constantly reach for a higher standard. We must be more professionally active. We must do more networking. We must pursue every award possible in order to be perceived more positively in the university community. However, we cannot stop there. It is also necessary to promote ourselves through public relations activities when we start achieving these objectives. Only then will developmental studies educators be viewed as assets instead of liabilities.

# Primary & Secondary Orientation Support for One Underrepresented Group

*Allen R. Barlow • Kerri Heavens*

## Abstract

*University orientation and preparation of a minority group (mature age women) was found to be significantly more successful when partners and families were included in the process. This paper outlines the processes and the outstanding success in reducing attrition, maximizing performance, and creating self-support learning cells that lessened this group's utilization of other support and developmental services.*

Western Sydney hosts one of the largest areas of concentrated disadvantage in Australia. The University of Western Sydney, at its center, has initiated and developed a number of major projects aimed at facilitating access for disadvantaged groups, particularly where few parents have previously attended a tertiary institution. This has led to a wide range of admission, orientation and support programs. One such offering is a university preparation program for mature age women (MAW).

## Project Description

Mature age women, particularly women of 30 years and over, frequently experience adjustment difficulties in their first year of tertiary study. A group of 25 women, many of whom had not completed secondary education or recent formal education, were selected for this program. They generally lacked the basic skills to be successful in university studies. The realization that basic skills are inadequate can contribute to feelings of anxiety, loss of confidence and lowering of self-esteem. Many ultimately "drop out" of the university.

MAW is an intensive program to assist in the development of strategies and skills in time management, essay writing, note-taking, library research, adapting to changing family role, self-esteem and confidence building and developing a peer support network combined into a learning cell that is capable of providing mutual support throughout the duration of the students' university careers.

### Aims and Objectives and Course Content

The project aims to assist mature age women to: (a) reduce the number of adjustment difficulties encountered; and (b) gain basic skills necessary to complete their chosen course.

Each mature age female student entering an undergraduate program was invited to participate in this tertiary preparation course. The course comprises approximately 30 hours of study in the week prior to orientation and is presented in both lecture and workshop format. The focus of the course was on developing specific skills and strategies in three areas: (a) study skills; (b) self-esteem and confidence building; and (c) adapting to changing personal and family roles.

The content of the study skills component of the course included active listening, motivation, organization, time management, methods of study, essay writing, sharpening mathematics skills, note taking, goals, handling distraction, timetables and their use, types of learning, exam preparation, and a library tour.

The content of the confidence component of the course included beliefs that reduce confidence, negative thinking, handling criticism, avoiding anxiety, negotiating conflicts, looking after yourself, and stress management.

The third component of the course focused on adapting to change; the content included role of the family and experiences of successful tertiary students.

The course participants were assisted to establish a peer support group. These groups continue to meet regularly to discuss problems and issues related to the women's studies and their personal lives. Most groups maintain their cohesiveness for the duration of their undergraduate course.

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## Profile and Number of Participants

In the cohort outlined in this paper, the majority of participants were married women living with their partner, six women were separated or divorced, and only two participants were single. The total number of dependent children of the participants was 68. The range of number of years since undertaking formal education was from twenty-eight to one year. Each session of the course had 100% attendance.

## Staffing

Teaching staff were drawn from the University of Western Sydney (UWS) when no suitably qualified Nepean employee was available. Preference was given to the employment of female staff in order to reinforce that women can be and are successful in the world of academics and work.

## Evaluation

The initial evaluation of this program consists of a questionnaire completed one week after the final session of the course; the second phase consists of a follow-up evaluation questionnaire and a review of performance by means of examination results for the year of entry. The response rate was 100%. The questionnaire requested participants to rate both presentation and content according to three levels of satisfaction, i.e. good, satisfactory or poor. In general, the ratings for each session of the course were positive. Study skills, time management and the library tour were consistently scored as "good", while confidence building and adapting to change were rated slightly lower. However, this is not surprising as the material in each of these sessions is often difficult to digest if the person has not been exposed to ideas of self-awareness and development. Adapting to change was designed to sensitize and prepare the participant for possible difficulties. Overall, twenty-two participants rated the course as being "very helpful", two rated the course as "helpful" and one person rated the course as "satisfactory".

All participants stated they would recommend the course to mature age women enrolling at the university. Participants were asked to suggest additional pertinent topics. These included revision of basic math and science; memory training; additional practice at essay writing; and a university tour. The general comments received and the results of the evaluation questionnaire clearly demonstrate that a need exists for mature age students to undertake a preparation course before entering tertiary studies.

## Performance

A review of the performance of participants in the program at the end of the first year revealed that these students performed better than matched controls and superior to traditional entry students. A majority of the participants who were enrolled in the initial course in 1990 have graduated and a number of those have entered into postgraduate study.

## Attrition/Progression

One of the most pleasing aspects of the program is the manner in which the small groups (learning cells) have been instrumental in actively discouraging drop-out or attrition. At UWS, the mature age women drop-out rate in their first year was originally in excess of 50%. Participation in the MAW has seen this figure drop to less than 4% in the first year in all groups for 1990-1994. By any standards, the success of this initiative is outstanding.

## Social Support

Some of the major concerns experienced by student support counselors range from domestic violence to simple lack of genuine support for women entering education. It was evident that although most enrolling women had the motivation, the aspiration and dedication to stay in undergraduate programs, the orientation and preparation was more appropriately and usefully directed to partners/husbands and families. It was for this reason that orientation included the family unit (in its many guises). Families were introduced to the university by way of barbecues, social events and a brief formal lecture. These activities aimed at educating the participants about the demands placed upon students. In some instances, the partners were encouraged to stay in touch with one another and, in fact, developed into an outer group of supporters who often complained to each other about their partner's participation in the university. This safety valve appears to have real advantages in lessening overall family demands on women. The women reported significant reductions in pressure from home to discontinue and in the anger and violence directed toward them by family members.

From a university perspective, it seemed that the social support network took the place of the support structures provided from the Counseling & Health Unit and the Learning Assistance Center. Participants in the MAW utilized these services to a much lesser degree than either matched controls or the general mature age female population resulting, in very real saving in support costs.

# Conclusion

This course has endeavored to equip the mature age woman student with academic and basic skills and strategies. The desired result is to ensure as far as possible that the student is prepared for study and the personal changes that will be a consequence of university enrollment and participation.

# Magazines in Developmental Writing: An Innovative Reading-Writing Connection

*Sandra Karnei Chumchal*

## Abstract

*A review of the literature shows a lack of information about the effective, practical use of news magazines in developmental writing. Practical teaching strategies, student evaluation, and session participants' responses illustrate the magazine's potential as a main text or supplement. Educators are challenged to conduct research on the magazine's effectiveness and appropriateness.*

Instructors in developmental writing courses seem to be in constant search of teaching ideas that will expand on the rich experiences that adult students bring to class. Instructors look for ideas that will enable the student to transfer learning to other courses. They are also interested in activities that connect reading and writing. Using the news magazine, even as a supplemental text, writing instructors may realize all of these goals. However, there is a shortage of research and articles describing its effectiveness in this setting.

Most of the literature on news magazines promotes their use in reading curricula or in public school writing education. Ritchey and Starke (1989) determined that among predominantly Hispanic community college students who scored between the eighth and tenth grade reading levels on a test of reading speed and comprehension, the holistic approach improved attitudes 100% while building skills as well as an isolated skills approach did. The holistic approach uses a combination of news magazines, newspapers, journals, and novels. Other researchers support the holistic design. Baechtold, Culross, and Gray (1986) maintain that "news magazines are a natural vehicle for teaching reading comprehension because each article may require a different combination of reading skills" (p. 305). Dwyer (1990) calls for using articles from news magazines or newspapers to help secondary students overcome weaknesses in reading and writing, as well as develop cultural awareness.

The population of students in developmental writing classes is very different from that in secondary education, given the growing number of nontraditional students. Further, developing writers must be prepared for college academic requirements. Despite the need for research and articles on this topic, I found only one article. Lambert (1984) presents practical teaching strategies for using magazines with developing writers. She defines and models summary writing. After reading and discussing articles, students write summaries as a group. Then they discuss and revise as needed. She concludes that her approach has instructional, cognitive, and affective benefits for her students.

## The Developmental Writing Program at Blinn College

The developmental writing program offers four courses, including English as Second Language (ESL) 0312, to meet student needs. Developmental English (DE) 0310 is the second level writing course. Emphasis in this course is on studying kinds of sentences (simple, compound, complex), sentence revision strategies, sentence variety/logic, punctuation, and writing short essays. Most students who enroll in DE 0310 are reading at the ninth grade level or above as indicated on the reading test. I have incorporated the news magazine as a supplemental text in DE 0310. A variety of assignments require the student to work at different levels of intensity and require different levels of instructor involvement. I have found all assignments beneficial depending on my focus and the availability of time.

For one semester's assignment, I use a process of alternating weekly assignments. One week I ask students to read an assigned article from a news magazine. Following class discussion about the article, students write one paragraph of summary. In a second paragraph, students respond to their reading. Each entry includes a bibliographical entry following Modern Language Association (MLA) format (1985) manuscript guidelines. I define the summary as main idea and supporting details to connect writing with reading. I model summaries and responses at the beginning of the

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semester and outline each article that is assigned to help students get started. Then I have students do more of the initial analysis in groups. The following week, while we are revising summaries, I ask for independent reading and completed "Fact Sheets" for two articles. The items on the "Facts Sheets" are as follows: (a) bibliographical entry; (b) who/what is the article about; (c) what does the author tell you about the who/what; and (d) explain three points that the author makes in the article. End of the semester evaluations compared to beginning surveys indicate that students are much more aware of current events as a result of the assignment. They also report feeling more confident about completing research assignments for other classes.

I have developed magazine assignments for writing descriptive, process, and persuasive essays. The assignment for the process essay, for example, can be very successful depending on students' skill levels. It enhances proficiency in analysis, synthesis, and critical thinking. I choose approximately three articles from a news magazine that discuss the process in which something occurs, develops, etc. Students read and study all three; then they choose one to write about. Their paper is a description/paraphrase of the process discussed in the article. This assignment is quite challenging for students. It requires a great deal of thoughtful effort from students working collaboratively. I provide much structure, modeling, and encouragement as they work through their analysis and writing. I see this as a very beneficial exercise, for it prepares developing writers for the rigors of college level work.

I shared a variety of other teaching ideas. Some assignments require students to choose vocabulary words from their reading in a news magazine. Still others for essay writing ask students to make presentations from their reading and analyze effective sentences. Session participants shared many valuable ideas, including how to handle subscription costs. Students can be billed directly from most magazine publishers; however, one participant explained how she arranged with the campus bookstore for students to buy their subscription when they buy the rest of their books and supplies. Another participant found that a magazine with a condensed format was effective for low-level students because most articles followed a similar pattern of organization. Once students understood that pattern, they could read more efficiently. Also, the topics provided students with inspirational reading that they could relate to their lives.

There are both advantages and disadvantages involved in using a news magazine curriculum. Among the advantages are providing potentially high interest reading; promoting awareness of current events; getting students actively involved; supplying students with thought-provoking ideas, feelings, and incidents to think about and write about; challenging students' ideas and values; helping students to develop logic and critical thinking skills; teaching students how to summarize and avoid plagiarism; avoiding the pitfall of using too many typical essay or journal topics; allowing students to read rather than be off task in class or lab; and avoiding copyright violations and budget constraints for xeroxing. There are some disadvantages. It is time consuming because discussion is critical for understanding. It requires adequate modeling, reinforcement, and feedback for success. Clear cut instructions and goals of the assignment must be provided. As a journal writing assignment, it loses effectiveness if students lose momentum or fall behind, then try rapidly to produce entries at the end of the semester.

Although I am personally convinced that using the news magazine in the developmental writing classroom is an exceptional idea, research must be done to confirm it. More importantly, research may allow one to determine which assignments are best suited for which types of students. A number of research questions remain to be answered:

(1) What are some practical teaching strategies using news magazines in the writing classroom?

(2) How does a news magazine curriculum influence students' attitudes about writing?

(3) What gains in writing ability do students make when a news magazine curriculum is used, either as the main text or as a supplemental text?

(4) What is the demographic/academic profile of the student that benefits most from a news magazine curriculum? In other words, for what population of students is the news magazine curriculum most appropriate?

(5) What effect does a news magazine curriculum in writing have on students' reading ability?

(6) Does a news magazine curriculum, in comparison to others, significantly raise students' gain scores on state-mandated tests of writing?

(7) Does a news magazine curriculum, in comparison to others, significantly improve students' performance in courses like history, political science, business, etc.?

Thus, the news magazine remains an innovative tool for the developmental writing classroom, but research is needed to fully evaluate its effectiveness.

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# Summary of the Final Report of the American Mathematical Association of Two Year Colleges: Standards for Developmental and Introductory College Mathematics

*Betsy Darken*

## Abstract

*The current period of upheaval in mathematics education raises two critical questions for developmental educators: what should we be teaching and how can we teach it effectively? New insights are provided by the Standards for Introductory College Mathematics, recently published by the American Mathematical Association of Two Year Colleges.*

A major upheaval is now occurring in mathematics education, with critical implications for developmental educators. Radically new answers are needed for our most basic questions: What should we be teaching and how can we teach it effectively? The Curriculum and Evaluation Standards for School Mathematics (National Council of Teachers of Mathematics, 1989) provided guidance for K-12 educators on these and related issues. Now the American Mathematical Association of Two-Year Colleges (AMATYC) is publishing a comparable guide for the college level, titled Standards for Introductory College Mathematics (1994). This important new document paves the way for the revitalization of developmental mathematics, as well as technical, mathematics-intensive, liberal arts and pre-service teacher programs.

The AMATYC Standards have four main premises. First, fundamental changes must occur because the current curriculum often fails to achieve its most important goals. Second, recent research on how students learn has the potential to greatly improve mathematics pedagogy. Third, changes such as technological advances and the increased use of mathematics in many fields have major implications regarding what is relevant for students to learn. Fourth, for the health of our democratic society, postsecondary institutions must continue to address the needs of diverse student populations and increase student participation in mathematics, especially by women, people of color, and other underrepresented groups.

To many of our students, learning mathematics has disintegrated into rote memorization of unrelated procedures and facts. The curriculum must be reformed so that students learn how to think logically and use mathematics effectively in the real world. The following principles form the philosophical underpinnings of the Standards: the study of mathematics is necessary for good citizenship and expanded career choices; the mathematics that students study should be meaningful and strongly connected to other disciplines; "competence is acquired through a careful balance of skill acquisition, conceptual understanding, logical proof, and creative problem solving" (AMATYC, 1994, p. 4); active participation, the development of student tenacity and confidence, and appropriate use of technology are key elements of an effective curriculum. These highlight the central theme of the Standards (AMATYC, 1994): "This document takes the position that problem solving is the heart of mathematics and that a major goal of mathematics education is to enable students to see the world from a mathematical perspective" (p. 11).

It is imperative to understand that all of these principles apply to developmental as well as college level mathematics. The fact that our programs are often called "basic skills programs" is indicative that too much emphasis has been placed on procedural learning. It is time to reconsider how well we are teaching our students to think mathematically.

Having established a set of principles for addressing this multifaceted problem, the Standards examine content and pedagogy, setting standards that are interpreted

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for various curricular paths and providing illustrative examples. The document also discusses the ramifications of a reformed curriculum for faculty development, placement, assessment and a host of other issues, and proposes a plan for implementation. Significantly, much space is devoted to developmental mathematics. Instead of being treated as a stepchild, the latter has been renamed the "Foundation" to emphasize its central importance in establishing a basis for students' use of mathematics in their future studies and careers.

The Standards address questions about content within the context of six overarching themes: numeracy, symbolism and algebra, geometry, functions, probability and statistics, and deductive proof. These themes pertain to all courses, although the depth to which they are covered varies. The applicability of all six themes to developmental mathematics implies a significant expansion in the scope of the latter curriculum. In fact, many readers may initially think that the writers of the Standards are out of their minds to suggest studying functions, probability, statistics and deductive proof in developmental mathematics! However, it is time to be open to the possibility of dramatic changes to this curriculum as we rethink its goals.

For instance, while the study of functions has been considered traditionally as an advanced topic, its central role in the mathematical modeling of real-world phenomena suggests that it should receive more attention throughout the curriculum. Note that patterns and relationships—often functions in disguise—can be explored numerically and graphically even before students study algebra. Likewise, realistic geometric topics and basic statistics can be integrated throughout the curriculum. In addition, the study of basic probability offers many fine opportunities for using fractions in realistic contexts.

Significant changes are also being proposed for traditional developmental topics. "Numeracy" has been used deliberately instead of "arithmetic" to emphasize this shift. Numeracy includes "the ability to estimate reliably, judge the reasonableness of answers, understand orders of magnitude and think proportionally" (p. 24). It is recommended that decreased attention be given to memorization, manipulative and routine operations with whole numbers, fractions and decimals.

Many questions still remain about changes in the study of algebra. These are key questions because algebraic manipulations have played such a dominant role in developmental mathematics. The increasing availability of computer algebra systems and powerful graphing utilities certainly adds a major new wrinkle to this discussion, and it will take time to understand their ramifications for the mathematics curriculum. With the full and somewhat unnerving understanding that it is embarking on uncharted waters, the Standards make the following recommendations for developmental and lower division mathematics: (a) emphasize conceptual understanding, stressing a multi-representational approach, e.g. numerical, symbolic, graphical, and verbal; (b) emphasize multiple methods of solving real world problems, including algebraic; (c) develop an appropriate level of proficiency with important algebraic manipulations; (d) develop a variety of methods for solving equations and inequalities, including paper-and-pencil, mental and machine-based.

Which algebraic manipulations are important and what level of difficulty should be expected? While complete answers will take time, a consensus is forming that the following topics should be de-emphasized: factoring techniques, simplification of radical and rational expressions, and contrived word problems.

With regard to instructional strategies, the Standards argues that we must reform how as well as what we teach. Teachers need to become more aware of research on learning, especially the constructivist theory that knowledge is not something given to students but rather something they must construct for themselves. Teachers play a key role in structuring new information so that students can relate it to what they already know (Brophy & Good, 1986). Students in this reformed curriculum will become thoughtful and competent problem solvers, familiar with a variety of mathematical tools and able to work with each other to solve real-world problems.

Get prepared for the twenty-first century! The publication of the Standards is the first major step in revitalizing developmental and introductory college mathematics. While supplies last, copies can be obtained by contacting: AMATYC, State Technical Institute of Memphis, 5983 Macon Cove, Memphis, TN 38134.

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# Effects of Testing Methods on Outcomes in Developmental Algebra

*Jeanette W. Glover*

## Abstract

*Effects of gender and testing method on three outcomes were examined for 73 developmental algebra students. Mean post-test scores and course grades were significantly higher for women than for men. Students tested traditionally scored higher on the post-test. Testing method and grade in subsequent math course were unrelated.*

Practitioners who assist at-risk students in learning math employ a variety of assessment measures: course grades, post-test scores, and performance in college level courses. Anderson (1989) suggested that success on objective tests is gender related. Other researchers (Johnson, 1991; Williams, 1983) found no differences in outcomes for students using different test formats. This investigation focuses on the relationships among testing method, gender, and outcomes for students in developmental algebra at an urban university.

## Methodology

During Fall semester, 1993 the author randomly assigned five sections of Developmental Algebra Two to one of the two testing strategies, i.e., either multiple choice or traditional, work-the-problem, testing. Students completed a diagnostic test consisting of 30 multiple choice questions devised by a departmental committee. The same instructor taught all sections using the same strategies. The post-test, the math portion of the Academic Assessment and Placement Program (Educational Testing Service, 1990), requested students to complete 30 multiple choice items in 35 minutes. Course grades were computed as a percentage of the possible points from four tests, the grades for homework and quizzes , and twice the grade on the final exam. Success in a subsequent college level math course was defined as earning a grade of A, B, or C. Grades of D, F, or DROP were classified as unsuccessful attempts.

### Data Analysis

The two independent variables, testing method and gender, classified students into four categories: females who completed multiple-choice tests, males who tested via multiple-choice tests, females who sat for work-the-problem tests, and males who took work-the-problem tests. Multivariate analysis of variance with diagnostic test score as a covariate preserved an experimentwise error rate of .05, compensated for correlations between course grade and post-test score, and adjusted for prior algebra knowledge. Post hoc univariate analyses of variance was used to investigate the impact of each significant main effect on the individual dependent variables. Relationships among testing method, gender, and success in college math were studied by cross-tabulating grades in college math separately with testing method and gender and then by calculating the value of chi-square. All data screening and statistical analyses were conducted using Statistical Package for the Social Sciences (SPSS) programs (SPSS, 1994).

## Results and Conclusions

Seventy-three students passed Developmental Algebra Two, completed the post-test, and attempted a college level math course. Analyses performed test-

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Table 1

Mean Performance Scores of Algebra Students Undergoing Different Testing Method

| | | Course Grade | | Post-test Score | |
|---|---|---|---|---|---|
| Group | n | M | SD | M | SD |
| Multiple-Choice | 45 | 75.93 | 14.33 | 15.09 | 3.84 |
| Males | 13 | 68.08 | 17.29 | 13.46 | 3.60 |
| Females | 32 | 79.13 | 11.80 | 15.75 | 3.79 |
| Work-the-Problem | 28 | 69.39 | 13.57 | 16.89 | 3.80 |
| Males | 12 | 65.75 | 8.53 | 15.83 | 4.11 |
| Females | 16 | 72.12 | 18.44 | 17.69 | 3.48 |
| Males | 25 | 66.96 | 13.57 | 14.60 | 3.96 |
| Females | 48 | 76.79 | 14.54 | 16.40 | 3.76 |

ed whether differences in the means presented in Table 1 are statistically reliable.

The interaction effect of gender and testing method was not significant, $F(2, 67) = 0.292$, $p = .748$. Post hoc analyses confirmed a significant main effect of gender on both course grade, $F(1, 68) = 6.212$, $p = .015$, and post-test scores, $F(1, 68) = 6.755$, $p = .011$. The females in the sample scored significantly higher than males on both course grade and post-test. Due to the significant main effect of testing method, $F(1, 68) = 6.052$, $p = .016$, students in the work-the-problem group scored higher on the post-test than the students who sat for multiple choice tests. An insignificant value of $X^2$ $(1, N = 73) = 0.5126$, $p > .05$, indicated no relationship between testing method in Developmental Algebra Two and grade in a subsequent college level math course. However, the significant value of $X^2$ $(1, N = 73) = 6.724$, $p < .05$, for the cross-tabulation of gender and college math grades indicates a relationhsip between gender and success in college math. Fifty-six percent of the women passed college compared to twenty-one percent of the men.

## Discussion

The results of this study parallel the findings of Johnson (1991) and Williams (1983) who reported no significant differences in outcomes using different testing strategies. Although Anderson (1989) found that men scored significantly higher than women on multiple choice questions, his subjects studied calculus. The women in this study did significantly better than men on all three outcomes studied. The study group included over twice as many women as men. Even though test statistics took sample size into account, another study including equal nunbers of men and women may shed more light on outcomes of developmental math instruction for the large population of students at risk of failing math in urban universities.

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# Breaking Down the Barriers

*Ellen Hendrix • Olivia Carr Edenfield • Kathy Albertson*

## Abstract

*The presenters modeled a successful reading/writing program wherein developmental studies faculty and general program faculty work together to expand the paradigms of developmental education in order to insure a seamless transition from developmental reading and writing to first year composition and sophomore literature classes.*

The Department of Learning Support (LS) and the Department of English and Philosophy at our institution have developed composition standards to provide students with a seamless transition from Learning Support through first year composition courses. The most unusual aspect of our program is the structure of the departments: 32% of the Learning Support Department instructors are also members of the Department of English. All faculty members of the English Department teach first year composition courses. Together the departments have also developed grading criteria so that the objectives on each composition level build or become more defined, but the standards for grading remain the same. In short, the faculty who teach Learning Support can better prepare students for first year composition because they know what is expected.

## Learning Support

Part One of the presentation demonstrated LS exercises in one reading/writing course that introduces similar writing strategies and assignments to those in first year composition courses. The combined class syllabus and assignments are based on Bartholomae and Petrosky's (1986) Facts, Artifacts, and Counterfacts: Theory and Method for a Reading and Writing Course, and Deen and Ponsat's (1985) The Common Sense: What to Write, How to Write It, and Why, the ideas being modified by our colleagues to fit a quarter system regimen.

Readings consist primarily of Adler's (1940) "How to Mark a Book," three novels, professional essays, and student/peer essays. Activities require readers' responses to the novels, to classmates' essays, and to discussion questions that force the students to synthesize information from multiple sources—looking for universals in their readings.

The writing portion has two distinct categories: the personal and the academic essays. When students write autobiographically, they do not have to be concerned with grammar or punctuation, just getting complete ideas onto the page. The mode for these assignments is cause/effect. For instance, the first essay asks that students write about a significant incident—what happened and how this event changed them. The academic essays use cause/effect and comparison/contrast, asking that students write about significant incidents, showing how and why a character changes, or they compare two characters from different works to show how each character changes. Additional writings involve practicing summary techniques by having the class read a psychology chapter on adolescence and then summarize the piece. This assignment leads to a group research paper wherein members compile common patterns of adolescence from any work used during the quarter; they must formulate their own theses and choose examples to summarize and quote for support. All academic essays are graded for content as well as grammar and mechanics to show areas in which an individual may still need work to be ready for success in the first year composition courses.

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## Composition I

Part Two of the presentation addressed three areas in the regular first year composition courses that coincide with the goals of Learning Support. Discussion was limited to the first composition course, outlining the similarities in grammar, style, and modes of writing.

Grammar, as in Learning Support, is approached existentially; in other words, students are responsible for learning the rules. Just as Learning Support teachers do not "teach" grammar, English 151 students learn grammar by accepting responsibility for their weaknesses. In this instructor's class, they address each individual error in every paper by doing correction sheets: an exercise that has a student write each mistake, correct it, and then write the rule that governs the correction. By beginning the course with short assignments that count only a fraction of the course grade, students can make mistakes without destroying their chances of success in the course. Responsible students can conference with tutors, the instructor, or may turn to their text for support.

In terms of style, Composition I picks up where Learning Support leaves off. Early on, students in this presenter's class read Strunk and White's (1979) The Elements of Style to get them thinking about their own styles and to give them a reference guide. Part Two also covered giving students vehicles for expressing their ideas by teaching different sentence structures. Students learn how the periodic sentence works as a way to organize information in a thesis or in a topic sentence and how the balanced sentence works as a way to summarize information in a conclusion. Students start to think about not just what they are saying, but how they are saying it. For example, students study the very different writing styles of Ernest Hemingway and Calvin Trilling and consider how each writer uses style to his advantage.

Composition I includes modes of writing that are a bit more sophisticated in comparison to Learning Support, but the differences are not radical. After a series of short papers to weed out grammatical errors, students write the personal essay; it is typically easy to write, with a familiar format, and a focus on introductions. Another mode familiar to the Learning Support student is the definition essay. Writing about literature using a mode that is easier than most, students learn to incorporate primary quotations.

## Composition II

Part Three of the presentation focused on Composition II, which emphasizes students developing an understanding of literary forms and terms, using the teacher's three choices of four literary genres: poetry, short story, novel, drama. Terminology helps students gain an understanding of how literary devices contribute to the authors' works.

As the students read and write about fiction, they hone the skills first used in Learning Support while they learn new skills needed for the next course, a survey of world literature. The first goal of Composition II is discovery. In class discussions and essay development, students must answer questions through analysis to show how the elements in a work contribute to understanding. Literary terms become more than just terms as they are considered in the students' analyses. Students look for words or images that suggest feeling; they examine characters' states of mind and personalities; they consider points of view and settings.

With their essays centering around a thesis, students use annotations in the Modern Language Association (MLA) format (Achert & Gibaldi, 1985) to supply evidence to support their central idea. Students then edit and revise skills they have developed in Learning Support and Composition I.

## Conclusion

Regardless of pedagogical approaches and philosophies within our classrooms and departments, the same expectations and standards allow us to prepare students for a smoother transition to each successive level of composition. Success rates demonstrate the program's ability to break down the barriers. Sixty-two percent of the LS students exit after the first quarter, and sixty-eight percent of those LS students succeed in English 151 by earning a C or better on the first attempt. Ironically, these successes come from students initially deemed "underprepared" for college level writing.

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# A Fair Chance for All

*Trevor Hulme • Allen R. Barlow*

## Abstract

*University education in Australia, until recent years, has been elitist and strongly biased toward providing for recent high school graduates. Mature age people, including many groups traditionally considered to be educationally disadvantaged, have been allowed access via specifically focused pre-tertiary programs. Those who have successfully completed these programs have, in comparison to conventional entry students, shown considerable success in their faculty programs.*

Headway and Unistart are pre-tertiary bridging programs of approximately 0.5 of a typical undergraduate semester load, designed to provide opportunities for people to gain the basic skills necessary to enter and succeed in conventional academic programs at University of Western Sydney (UWS) Hawkesbury and UWS Nepean. (These campuses are 12 miles apart geographically). Students complete studies in written communication, basic mathematics, computer skills, library skills, preparation for learning skills plus bridging in the basic science and mathematics areas. These programs are targeted for the people of Greater Western Sydney who have experienced educational or social disadvantage (e.g., lower socio-economic status), which has prevented them from fulfilling their educational and aspirational goals. Preferential entry to the program is usually given to residents of Greater Western Sydney.

## Program Objectives

The main objectives of the program are to identify learning deficits and to assist students to bridge gaps in knowledge before attempting a degree; to develop independent learning skills; to form peer support groups with fellow students to share knowledge and encourage each other; to foster participation in an environment that is academically supportive and success orientated; to introduce students to typical university assessment procedures; and to familiarize students with university standards, policies and procedures.

## Selection Procedures

Each year advertisements are placed in the local newspapers, notices placed in community areas such as supermarkets, community announcements made over radio, and promotional material provided to careers advisers in high schools and colleges of technical and further education. Preference is given to mature age people (over 21 years of age) with any remaining places made available to recent high school graduates. All applicants must be able to demonstrate some form of educational or social disadvantage or belong to a cohort identified by the Australian government as having low participation rates in higher education. Entrance to the program is by a screening interview undertaken by the staff of the Learning Center subsequent to a written application meeting the initial criteria. This interview attempts to assess the motivation and ability of a candidate to succeed.

At a point midway through the program another interview is conducted by a faculty member (with Learning Center staff present), at which point an offer of an undergraduate place may be made subject to the notional belief that success is possible for that student and provided the student is successful in both phases of the preparatory program. Faculty and staff are

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involved in selection, mid-term interviews and used to teach in the faculty specific modules.

## Program Content and Assessment

The program consists of two components. Phase 1 includes computer skills, 30 hours; library skills, 10 hours; basic mathematics, 45 hours; preparation for learning; 15 hours; and written communication, 35 hours. For Phase 2 there is faculty-specific module participation. For example, students undertaking science based programs study at least one 30 hour science subject, such as chemistry, physics, or biology plus scientific mathematics for 30 hours. In addition, students take 30 hours of advanced written communication. Faculty and staff identify subject modules that are appropriate and prerequisite to their undergraduate programs.

Continuous assessment and counseling of individual students throughout the program recommends that students either continue on or leave the program. Those leaving are directed into study routes that would be more suitable to their current skill level and conceptual development. Both phases of the Headway and Unistart Programs are assessed.

Assessments are diverse and on-going, and designed to prepare students for tertiary assessment modes. Methods include essay writing, both take home and under examination conditions, seminar presentation, small group assignments, completion of a learning journal, numeracy testing and assessment of note taking skills from videoed lectures. (Cobbin, Barlow, Trampus, & Tiernan. 1992).

Usually one combined examination will be held at the end of the first section of the program. This may include some or all of the subjects being studied in the program. Students who have successfully completed both sections of Headway or Unistart normally proceed into the undergraduate program they have nominated.

## Comparison with Normal Entry Students

It is possible to compare Unistart and Headway students with comparable groups of traditional intake students by year of matriculation. Since the grading of students has varied somewhat from campus to campus and has changed over the past few years, it was decided to implement a five point system that would allow valid comparisons across campuses and programs. This system suits most programs, except Agriculture at Hawkesbury, which uses an experiential based learning model and allocates only satisfactory or fail grades. A mean grade was calculated by summing the points scored for each grade and dividing by the number of subjects attempted during the year. The following system was used (Cobbin, Barlow, Trampus, & Tiernan, 1992): 0=Fail, Withdrawn; 1=Pass, Conditional Pass, Satisfactory; 2=Credit Level Pass; 3=Distinction Level Pass; 4=High Distinction Level Pass. Figures for the period 1991 to 1993 have not been collated for Unistart students so it is the intention of this paper to use the Unistart data for the period 1985 to 1990 as a control group to compare with data for Headway 1991 to 1993. It is believed that similar levels of educational and social disadvantage exist in the pool of applicants to both Unistart and Headway.

Data are for 1985 to 1990 for Unistart graduates and for 1986 to 1991 in mainstream undergraduate programs. The grade for the entire year of the mainstream program entered by the Unistart students, based on the above five point grading system, is 1.3. Data are for 1991 to 1993 as Headway graduates and 1992 to 1994 in the first year of mainstream undergraduate programs. The mean grade for the entire year of the mainstream program entered by the Headway students, based on the above five point grading system (Bolton, 1994), is 1.24. Comparison of results shows a close agreement with the mean grades of the Unistart and Headway students. Rigorous comparisons cannot be made because the time periods over which the studies were conducted are substantially different. Cobbin, Barlow, Trampus, and Tiernan (1992) report that for the total period, 1986-1991, the mean grade of students entering UWS, Nepean via traditional entry modes was 1.26.

It can be concluded that both Unistart and Headway students are performing in their undergraduate programs at least as well as the traditional entry students entering both campuses. Anecdotal feedback from faculty deans and heads of schools supports this view. The 1986 and 1991 cohorts of Unistart students performed extremely well with mean grades of 1.6 and 1.5 respectively; the 1993 cohort in Headway obtained 1.5, significantly better than the cohorts of traditional entry students.

The Headway program had the benefit of learning from insights gained with the Unistart program. Science based study was in need of considerably more skills development than was originally envisaged. The

early science modules taught in the Headway program focused on teaching the language of science. Although giving students considerable advantage over traditional entry students who had done no science in high school, it did not address the required skills base adequately. A mean grade for Science and Technology of 0.8 for 1992 reflects this. For 1993 and 1994 Science and Technology, the mean grades were significantly improved, being 1.84 and 1.44. Allowing for the fact that the 1993 group was a generally better prepared cohort than that of other years, it is apparent that considerable skill gains were made by the introduction of more comprehensive chemistry and physics curricula into the Headway program. These were 30 hour modules conducted by postgraduate students selected because of their skill both in communication and in their discipline area. Feedback from Headway students has indicated their appreciation of the peer support gained from teachers closer to their age group and the insight they could give because they were still within the university system.

There is now a considerable amount of evidence indicating the pre-tertiary programs such as Unistart and Headway are valuable in assisting otherwise ineligible students to enter university and to be successful in their faculty programs.

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# Academic Probation: A Road to Academic Success

*Marjorie L. Illingworth*

## Abstract

*Students on academic probation need a realistic opportunity to succeed academically. Without intervention, students often repeat the same behavior that contributed to academic probation status. The Academic Probation Intervention Unit utilizes resources already available within institutions and integrates them into a program that will support students as they strengthen skills.*

Each semester, Tanana Valley Campus, University of Alaska Fairbanks (UAF) has a significant number of students placed on academic probation. Academic probation status seriously impacts the students' ability to proceed toward degree completion by interrupting financial support, removing housing options, and blocking access to subsequent classes or even degree programs. The probation status also impacts the university in terms of retention because students with even a 2.0 retain at a significantly higher rate than those with lesser grade point averages. A significant number of students on academic probation do not improve their status in subsequent semesters. There is little disagreement that something needs to be done, but new programs must compete for the limited funds available to the university as a whole. A major consideration in the development of the Academic Probation Intervention Unit (APIU) was cost; therefore, APIU integrates existing, but often fragmented, services to effectively intervene on behalf of students and provide a central access point that is easily prescribed and visible to advisors and to the students themselves.

## Characteristics of the Academic Probation Intervention Unit

The APIU is comprehensive. Academic probation is caused by a combination of several issues: weak academic skills, poor time management skills, lack of direction, intrusive personal issues, financial concerns, poor use of resources, and a lack of understanding of institutional requirements. APIU utilizes a comprehensive format to provide the varied services needed to foster academic success.

The unit is integrated; thus, the multiple factors impacting student success are addressed, needed skills are introduced, and students are supported in integrating new skills into their courses, study habits, and life situations. Weekly meetings also allow for regular contact with the advisor, on-going oversight, and timely intervention.

The APIU is flexible and individualized. For the Academic Probation Intervention Unit to meet individual needs, it must be flexible enough to accommodate diversity, not only in academic areas, but in the areas of personal development, study skills, financial realities, and even areas of social and ethnic diversity. The program advisor is the key to the necessary flexibility, meeting with students to review previous academic history, current skills, and non-academic issues to develop a plan that includes academic courses, study skills, tutors, financial aid, and university and community support resources.

The Academic Probation Intervention Unit is easily prescribed. Grouping students together with one or two advisors who specialize in advising such students allows for an efficient system. This unit advisor is visable to other advisors so they can refer students. The academic probation advisor can be well versed in the university requirements that have the greatest impact on students who are on academic probation.

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The APIU is cost effective. It was initiated as a part of a grant funded program. This ensured the initial design and implementation of the program. However, cost effectiveness is a serious issue for any program that is to become a permanent part of any post secondary institution. APIU is a coordinated delivery system designed to incur as little additional expense as possible by using programs, academic sections, special services, and other intervention options already in existence within the institution or available in the surrounding community. The only on-going expense accruing to APIU is that of the additional one credit sections that form the core of APIU and the additional advising required. The benefits of increased retention may offset the costs of the added section.

## The Unit Plan

APIU involves students on academic probation and students readmitted to the UAF after declaring academic bankruptcy. Students are assigned to the unit advisor. The advisor reviews students' academic history and directs them toward classes that address individual academic needs, including a comprehensive, three credit study skills class. Additionally, students are assigned to one of two academic probation support sections. Weekly meetings, facilitated by the APIU advisor, focus on integrating study skills and personal development skills into other academic courses. In the process, participants learn effective interaction skills, form study groups, and share information on university and community support systems. Weekly meetings assure that students are aware of campus deadlines and allow for timely intervention when problems arise. Students are also encouraged to access university services such as career advising, personal counseling, peer support groups, tutoring services, and academic support labs. Referrals to community services offer additional support. APIU adapts and integrates these existing programs into a manageable, integrated, budget-conscious, easily prescribed, and easily individualized module that leads students from academic probation to academic success.

## Program Assessment and Evaluation

Evaluation is one of the most important considerations in the development of any project. The Academic Probation Intervention Unit was developed with evaluation as an integral component. The evaluation process, like the unit itself, is multifaceted and is sensitive to the various goals of the unit and to the needs of the participants. Formative evaluation is used to evaluate both the project and participant progress. Summative evaluation is directed primarily at the unit. Evaluation is provided by instructors and participants. National, university, and program generated statistics provide norms and standards.

Frequent and directed assessment of instruction provides a more timely and specific evaluation of whether students are learning material. The process includes students and encourages them to articulate what they have learned in a particular session. Instructors receive an immediate response to instruction and can quickly modify strategies to meet the needs of the students. Students learn critical thinking skills while taking a greater responsibility for receiving instruction and determining what is learned. The evaluation process validates students when their opinions are sought and acted upon. Instructional assessment becomes a powerful tool building student confidence as well as improving instruction.

## Conclusion

The integrated approach to academic probation intervention fills a significant need at Tanana Valley Campus. When students are offered the opportunity to stay in the university system, even after failing academically, it is critical that they have a realistic opportunity to succeed in that semester and future semesters and thus progress satisfactorily toward a certificate or a degree. Unless there is some form of intervention, students are likely to repeat the same mistakes, fall victim to the same weak skills, or make the same inappropriate choices that contributed to their academic probation status. The Academic Probation Intervention Unit is based on the premise that such a program can address student weaknesses with a minimal impact on the university budget.

The characteristics of the program are that it is comprehensive, integrated, flexible, easily prescribed, and cost effective. The Academic Probation Intervention Unit utilizes existing university courses and services and integrates them in such a way as to benefit each student. The program construction includes comprehensive formative and summative evaluation components ensuring a high quality program. It is responsive to student needs and has a cost effective format. Grant funding ensured the initial development of the program and four pilot semesters. At the end of the funding period it will be necessary to secure another grant or the University will need to assume responsibility for the program. Hopefully, by that time the benefits of the program will support either option.

# Arts Internships as Transition Space for Students at Risk

*Linda Adler Kassner • Terence Collins*

## Abstract

*A cooperative transition project for urban youth at risk of not making a successful transition from high school to college involved the lower division open admissions unit of a major urban research university and an African American professional theatre company. Students, nearly all of them African American or mixed race, engage in arts internships at the theatre while making a first attempt at college courses. The supportive engagement with creative professionals in the home community smoothed the transition and proved effective.*

This paper reports on a collaborative transition-to-college project involving the University of Minnesota's General College and the Penumbra Theatre, an African American professional theatre company. With support from the Fund for the Improvement of Postsecondary Education, our task was to develop a transition program for students, many of them African American, who said they wanted to continue with their educations after high school, but who, because of a number of factors, seemed at risk of not doing so. Nearly all of the students were seniors in Minneapolis and St. Paul, Minnesota, public schools. They participated in internships at the theatre and took courses at the college. Theatre and college personnel also acted as mentors for the students, working with them on transition issues. By working with students at these different sites, we hoped to test whether community based engagement with fine arts through internships would help them make a successful transition from high school to whatever postsecondary education they wanted to pursue. Data gleaned from questionnaires and interviews with three cadres of student participants demonstrate that these community based, fine arts internships promoted the successful movement of these students into higher education.

Projects attempting to smooth the transition between high school and college are not unique, nor are projects that involve some form of the arts in order to enhance students' experiences. Successful transition projects that involve mentoring and contact with the workplace are described in literally hundreds of articles. Bloomfield (1989), for example, describes the Career Beginnings Program, which placed "moderately achieving" high school students in college courses and provided them with counseling, tutoring, and other academic support. Buck (1985) reports on University of California, San Diego's successful Summer Bridge Program, whose students participated in a four week program that provided coursework, time management seminars, and contact with successful student peers. Similarly, many articles report on successful partnerships between arts organizations and schools that benefit high risk youth. In these arrangements the students are usually directly involved in the performance aspect of artistic production — they are playing instruments, or writing or performing in plays — developing their abilities to create art. Johnson and Barry (1993), for example, described a collaboration between the music program at Auburn University's College of Education and schools designed to garner support and encouragement for children from parents, the school, and the community. Soper (1993) chronicled the activities of Washington, D.C.'s Kennedy Center for the Performing Arts, which included the promotion of school-community partnerships. Safer and Harding (1993) described a program operating in Chicago junior and senior high schools, called Under Fire, that used theatre as one venue for students to consider questions and problems connected with substance abuse.

There are two important characteristics that distinguish the General College-Penumbra program from these models. First, these projects are generally two way, that is, between either school and college, or

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school and community organization. Ours was a three way collaboration between the students and their schools, General College, and the theatre. Second, those programs that involved collaboration between arts agencies and high risk students had students participating in the craft of the agency — like music, theatre, or playwriting — rather than participating in its day-to-day management. Our approach was different. We hypothesized that by having students help with the everyday functions of the theatre, they might make important connections with staff who were more permanent parts of the Theatre than the actors, and we hoped that students would find some "real world" value for the critical thinking and learning skills they were gathering in the classroom. In this way, our program also shared characteristics associated with community service projects in which students participate in "real" work settings in order to establish connections between the knowledge they gain in school and that required in the workplace.

By creating this unique partnership, we hoped not only to smooth students' transitions from high school to postsecondary education, but to do so in a way that involved their home communities. We did so because research by Bartholomae (1985), Tinto (1993), and others has shown that students often do not succeed in college because they feel that their collegiate experience bears little connection to the communities in which they lived previously. Bartholomae suggests that if students do not perceive this connection, they often "invent" a dysfunctional university for themselves in which they cannot find a place. As statistics bleakly remind us, this invention is for many of the underprepared not supportive — students invent a university that must fail them, or that they must fail. Tinto (1993) shows that in open admission colleges, 28% of part-time students and 30% of the full-time students enrolled do not return for the second year. The figures for public two year colleges, which many of our students said they might attend, are even less encouraging: there, 47% of the part time students, and 54% of those enrolled full-time, do not return for their second years. Tinto argues that to arrest this, the institution must demonstrate a commitment to students by developing an effective educational program that provides helpful feedback to students, and must foster a positive and supportive social and intellectual community. An essential part of this effort is mentoring, helping students develop a personal connection within the institution.

The Penumbra-General College Program was thus designed to ease the transition between secondary and postsecondary education for high risk students by placing them in internships in a theatre in their home community, by introducing them to college coursework, and by providing them with mentors both from the theatre and the college who would work closely with them on transition issues. In so doing we developed the following postulates:

First, that the mediating agency, Penumbra Theatre, would have a supportive impact on transition issues; that students would find mentoring, intellectual engagement, and culturally diverse reinforcement in the theatre internships, minimizing what Brookfield (1995) has called the "impostor participant" syndrome and the "cultural suicide" phenomenon among at-risk students who enter higher education.

Second, that students would make some connection between the things they grew to value at the theatre and the introductory coursework in Basic Writing and African American Literature they were engaged in at General College, however indirect this connection might be.

Third, that this community based support and reinforcement would help them make a more successful transition into higher education.

The data collected over three years support the claim that this cooperative model was effective in promoting the successful transition of our sample of 60 students into postsecondary education. Space limits prevent a detailed report of data gathered from questionnaires and follow-up interviews; however, selective representation of qualitative data taken from interviews allows for "snapshots" of program impact.

On the first question, whether students would find in their internships at the African American theatre company the sorts of culturally-grounded supports we had imagined being derived from a "home community" mediating agency, students said surprisingly consistent, positive things, represented by the following:

"I think that Penumbra, especially [the artistic director] feels that it's important to bring young people from the community into the theatre, and, you know, if they're interested to get them to know how the theatre is and how it works and how it runs."

"Blacks work easier with Blacks, they work easier with minorities in general, I guess it's how I was raised....I think it's good that Blacks be taught by Blacks. The younger generation should be taught by the older generation because they've already gone through it, so they can relate and show them the way.... I guess it's good to have something where Blacks are organizing everything. I'm proud to be involved."

"Most of their plays have to do with African Americans.... I thought I could learn more, I thought

that maybe working with African American plays could teach me more."

Whether talking to theatre staff, completing work at the theatre that they felt had some connection to their coursework, or simply working among a predominantly African American staff, students reported the experience to be extremely valuable because they felt welcomed and comfortable at the theatre.

On the second question, whether students would make connections between work at the theatre and demands at the college and find some connections among the strengths tapped by each, students were similarly positive, even though staff were careful not to assert that such links existed. After some initial organizational glitches THAT students were critical about, they did indeed see a strong connection in areas such as personal responsibility: "Work [at the theatre] made me think about my responsibilities a lot more, like where I'm supposed to be, getting to places on time. We had to get our own books, go to the bookstore and buy them, buy our disks. If you didn't know how to use the IBM [in the writing class] you had to learn how to use it. It wasn't just handed to you. You had to do it for yourself." For some, the connections were very practical: "Interning with the theatre's public relations person, I wanted to become a better writer and in my writing class I worked hard to do that." For others the connections were more abstract, although equally powerful: "The program teaches us through the Black person's eyes, the Black person's views. And that's what I think I was really learning."

On the third question, whether the mediating agency of community based support and reinforcement would help make for a more successful transition, students gave unqualified, overwhelmingly positive responses. For some students, the program made the difference between attending college and not attending. One student reported that he was "pretty burned out from high school," but that after participating in the program "I was treated like I was important, I got good responses, I enjoyed the work. Until that happened, I hadn't understood the true difference between college and high school. And it made me anxious to go to college." Others reported seeing the combination of academic, social, and cultural preparation as instrumental:

> I think the program prepared me for college. Academically, it taught me responsibility — no one's harping at you about your work, you had to do it yourself. You had to handle your own responsibilities. Socially, it prepared me too. High school is a totally different thing. Taking classes at the U socially prepared me because in high school it's the popularity contest. In college, you're there on your own...you were equal with everyone, and had to do things yourself.

We also found an additional benefit, that students became more adept at articulating the ideas they brought to the academy in a discourse more appropriate to it. At the theatre, they found reinforcement for those ideas, and in the college courses, they learned to express them using conventional academic discourse.

Our follow-up research indicates that this kind of program can be remarkably beneficial for students at risk of not successfully making the transition to higher education. It allows them to feel connected to an organization in their home communities that helps to validate their knowledge and expression; it helps them realize that they can function as themselves in a post-secondary setting; and it helps them learn how to articulate their ideas in a way that is acceptable within the academy as neither "impostor" nor "cultural suicide."

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# Tutor Training Enhanced By Knowledge Of Tutee Expectations

*Joan L. Krabbe • Mark A. Krabbe*

## Abstract

*A comparison of tutees' and classroom students' perceptions of tutors and instructors provides ideas for improving tutor training. The results indicate that tutees have different needs and expectations than classroom students. Tutees expect greater personal relationships, while classroom students expect greater skills in teaching and presentation of material.*

Current practices in college learning centers indicate that some learning center staff hire any student with a grade of A or B in a particular course to tutor a struggling student. Tutor training occurs only after the tutor begins tutoring. The idea is to provide struggling students with some kind of academic support as quickly as possible so that the struggling student does not "lose heart" or give up in defeat. In fact, many tutors work with tutees in a tutoring situation without ever getting any specialized training. When training does take place, the typical tutor training includes listening skills, note taking skills, learning styles, questioning techniques, test taking skills and various reading skills.

Research reported by Hunter Boylan (1993) revealed that tutoring was effective only to the extent that tutors were trained. Martha Maxwell (1990) reported that training for tutors was important. Gier and Hancock (1993) identified the key topics that should be covered in typical tutor training programs. They are (a) communication skills, (b) communication/listening, (c) functional fixedness, (d) role modeling and problem solving, and (e) empathy training.

Although many programs throughout the United States address these skills, Ross MacDonald (1991) focused his research on the actual communication, both verbal and nonverbal, between tutor and tutee. MacDonald's study seems to imply that the most significant behavior of tutor with tutee is the communication, both verbal and nonverbal, that occurs between the two of them. He made no reference to the training that the tutors had prior to his evaluating their tutorials, yet it is reasonable to believe that the communication would reflect how much a tutor knows about learning and about the subject matter being tutored. In the light of these research efforts it appears that success or failure, at least in the eyes of the tutor and tutee, has much to do with the expectations that the tutee has upon entering into the tutoring contract. The literature, however, does not reveal any study that looked at what tutees like, dislike, and expect from their tutors.

The objective of this study was to determine if tutees have different expectations of tutors than classroom students have of instructors in order to find ways to enhance tutor training. The specific questions were (a) what do tutees and classroom students like best about their tutors and instructors? (b) what do tutees and classroom students like least about their tutors and instructors? and (c) what do tutees and classroom students expect from their tutors and instructors?

Fifty-five tutees who used the Office of Learning Assistance for tutoring during the Spring and Fall Semesters of 1994, and seventy-five classroom students of junior and senior standing responded to a questionnaire consisting of three open-ended questions asking them what they liked best and least about, as well as expected, from their tutors and instructors. Students responded revealing their perceptions and feelings about all their tutors and all their instructors.

Classroom students responded that they like instructors who are interested in them and are compe-

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tent teachers, who are knowledgeable, fair, enthusiastic, and well organized. Tutees responded that they like tutors who are friendly, helpful and able to explain ideas thoroughly because they are knowledgeable, interesting, positive, punctual and dedicated.

Eighty-seven percent of the tutees like best the personality of their tutors, responding that the tutors are friendly, easy to talk to, understanding, and patient. Sixty-eight percent considered that the best thing about their tutors is that the tutors are helpful in giving suggestions on papers/assignments, going over homework, providing extra information, and giving advice and study tips.

In response to the question "What did you like least about your instructors?" classroom students responded that they do not like instructors who are arrogant, inflexible, unfair in testing/evaluation, boring and poor teachers who are not organized and not available. Tutees provided little data about their dislikes of tutors. Sixty-four percent of the tutees indicated that there is nothing to dislike about their tutors. The limited data the tutees did provide indicate that they do not like tutors who are not knowledgeable and not flexible with tutoring time.

Classroom students expect their instructors to be knowledgeable, personable, interesting teachers who are fair, interested in students, challenging, organized and dedicated. Tutees expect tutors to be helpful, friendly and able to explain the material clearly. Ninety percent of the tutees said they expect their tutors to answer their questions, to help them with homework and class problems, and to prepare them for tests. Twenty-five percent of the tutees mentioned being friendly and understanding, and twenty percent said they expect their tutors to be able to explain the material clearly.

When comparing what classroom students like best about their instructors and what tutees like best about their tutors, the data indicate that classroom students like instructors who are good teachers, who are knowledgeable, competent in teaching skills, and well organized. Tutees, however, prefer tutors who have good personality characteristics such as being friendly, helpful, positive, punctual and dedicated.

The relatively few tutees who did indicate that they did not like certain aspects of their tutors stated that the tutors were not knowledgeable and flexible. They also stated characteristics under the category that tutors did not have pleasing personalities.

Classroom students did not hesitate to indicate what they did not like about their instructors. They do not like closed-minded, unfair, boring instructors who are unrealistic and incompetent, and not personable. It is interesting to note that classroom students like instructors who are good teachers and do not like instructors who do not have good personality characteristics. On the other hand tutees seem to like tutors who are personable and do not like tutors who are not knowledgeable and flexible.

The majority of tutees expect their tutors to be friendly and helpful. The data indicate that tutees have greater expectations of the tutor to be more personable than to be good teachers with a lot of knowledge. Classroom students, however, expect instructors to be knowledgeable, interesting teachers, fair in evaluations, and organized.

A comparison of these responses indicates that tutor-training needs to be more than merely providing tutors who are knowledgeable and able to explain ideas like good teachers. The responses suggest the following recommendations for tutor-training: (a) when selecting tutor-candidates, the Learning Assistance staff needs to take into consideration their personality, (b) the academic ability of tutor-candidates needs to be measured by more than just an "A" or "B" in the course they will tutor. (c) tutor-training should include study skills and test-taking techniques that can be taught to the tutee, (d) tutor-training should include activities to help the tutor develop communication and personal skills, (e) tutor- training should include practice on how to encourage and motivate the tutee, (f) tutor-training should stress the importance of being flexible and punctual, and (g) tutor-training should provide the tutor with the opportunity to develop positive and enthusiastic attitudes.

In summary, tutor-training needs to prepare tutors who have pleasant, friendly personalities; who are able to communicate to and listen to tutees; who are knowledgeable and have the ability to explain at the tutees' level; and who have positive and enthusiastic attitudes.

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# Supplemental Instruction in Biology at the College Level

*Ofra N. Peled • Anna C. Kim*

## Abstract

*Supplemental Instruction (SI) in biology at a multicultural university campus was found to significantly increase student achievement. To avoid the bias of the conventional method of assessing the success of SI, exam grades of whole classes with SI tutors were compared to those of classes without tutors.*

Supplemental Instruction (SI), a form of peer tutoring, is an integrative model of student academic support, which was developed and tested during the mid 1970s at the University of Missouri (Blanc, DeBuhr, and Martin, 1983). It is a process-product paradigm that determines its success on the final outcome, that is, on the grades of students who attend the SI sessions. It has been implemented at 150 institutions of higher education (National Center for Supplemental Instruction [NCSI], 1994) including National Louis University (NLU).

The population of NLU's urban campus has a high percentage of returning adults, non-native speakers, and students of color. Approximately 20% of the students are Black, 10% Hispanic, and 6% Asian. These percentages are about three times higher than the minority percentages in Garland's study (1987).

The primary purpose of the tutorial sessions at NLU is to help less able students improve their performance in high-risk courses. The SI leaders, or tutors, are students who have successfully completed the course they tutor and are recommended by the instructor. At NLU most of the SI tutors in biology have been students intending to major in elementary education. Although they take biology as part of their general education requirement and before entering the education program, they have an inclination toward teaching, to be patient, open, interested, and motivated.

Previously the success of SI tutorial sessions has been determined only by comparing the grades of students who attended tutorials with grades of students who did not attend tutorials within the same class (Blanc,DeBuhr, & Martin,1983; Lundeberg, 1990; Martin & Arendale, 1991; NCSI, 1994). However, attendance at the tutorials according to the SI model is voluntary. Because this is a self-selected group within the same class, it is to be expected that their grades will be different, and drawing any conclusions from their different grades is liable to be grossly biased. Comparisons of grades of students within the same class would be meaningful only if the two groups were randomly assigned.

Within the classes that had a tutor, the students who attended tutorials received grades that were on average 12% higher than students who did not attend any tutorials. This is about twice as much as the improvement of about one-half a letter grade found by Garland (1987) and NCSI (1994). However, such differences are not necessarily attributed to the tutorial sessions. Of course, many of these higher grades may reflect the interest, motivation, time devoted to study, and other characteristics of the self-selected group of students who choose to attend tutorials.

We compared the average grades of the 14 classes. The 92 students in the five classes with a tutor averaged 74.1, while the 140 students in nine classes without a tutor averaged 67.6.

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The classes were taught by the same instructors using the same text and the same syllabus. Each class took two midterms and a final exam. The final test grade was the unweighted average of the three tests calculated in percentage points. Final letter grades were not used in the present study as recommended in the SI model because the final grades included points for the less objective laboratory reports, homework problems, and oral reports. The actual test grades are more objective and comparable measures of knowledge because the scores are percentages of correct replies to a sample from a pool of questions.

The difference in the average grade of the two groups was 6.5 percentage points. The two groups were significantly different to a 0.05 confidence level as tested by the Mann-Whitney U-test (Siegel, 1956). Classes with a tutor had more students with higher grades, and the classes without a tutor had more students with lower grades.

To statistically analyze the grades, low grades (those below 60%) and high grades (those above 80%) were examined. We found by means of a Chi square test that there was a significant correlation between classes with a tutor and the achievement of high grades. This was true for both the high grade groups and the low grade groups to a 1% confidence level. Other investigators (Blanc,DeBuhr, & Martin,1983) showed that the percentage of failures and withdrawals decreases along with an increase of attendance in SI sessions. In our classes, the attendance in the tutorial sessions ranged from 54% to 75%. The average number of sessions attended by any student varied from 3.2 to 7.3. Presumably, if all students had attended all sessions, the improvement of the average grade would be more extensive than that observed.

In conclusion, neither our approach of comparing the achievements of whole classes with and without a tutor, nor the SI method of comparing achievement of students who did or did not attend tutorials, gives a full account of the potential of the SI program. Our approach reflects the effect of the tutor, but certainly underestimates the maximum impact that may be gained from tutorials. But both methods of assessing success demonstrate considerably higher success rates. These results should encourage students to attend SI sessions in increasing numbers and more regularly.

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# Building Mathematical Understanding: From Counting to Chaos

*Patrick Perdew • Jennie Preston-Sabin • Bonnie M. Hodge*

## Abstract

*Mathematics instructors at all levels must be keenly aware of the need for students to make real world connections. Instructors must go beyond minimum skill levels and provide opportunities for students to explore mathematics. This paper focuses on the implementation of long term assignments in mathematics classes.*

Many students do not appreciate the relationship that exists between mathematics in the classroom and the mathematics found in their out-of-class activities. Mathematics instructors at all levels must be aware of the need for students to make connections between pencil and paper computations and real world applications. Placement in a developmental mathematics course may be due to a student's lack of interest and negatively reinforcing experiences, rather than a lack of ability. "Teachers at all educational levels should have the expectation that students from all segments of the population can be successful in mathematics. The teacher is in a key position to stimulate and encourage all students to continue the study of mathematics" (National Council of Teachers of Mathematics, 1994, p.18). Therefore, instructors must be willing to go beyond producing minimum skill levels and provide students with the opportunity to explore mathematics. Students, in addition to demonstrating proficiency in basic algebraic procedures, should demonstrate growth in their understanding of mathematics in the real world.

Long-term projects show students mathematics in its best light, much like reading courses expose students to classical literature rather than just sentences in a grammar book. Long-term projects also provide a form of alternative assessment besides traditional exams and quizzes. This presentation focused on the implementation and use of long-term projects in the developmental mathematics classroom.

The assessment of the long-term projects was based on two main factors: (a) whether the student had made connections to mathematics outside the classroom, and (b) whether the student had grown as a result of the research and problem solving used in the project. At the beginning of the semester, students were given guidelines for the long-term assignment as provided in Figure 1, as well as the grading scale was provided in figure 2. The students could choose any math related topic that interested them, or from a

Figure 1. Outline of the requirements for student project

I. Project Proposal
- A. Detailed outline
- B. Answers to the following questions
  1. Why did you choose this topic?
  2. How will you research the information?
  3. What do you expect to be your outcome?

II. Project
- A. Cover page
- B. Written report - APA guidelines
  1. Narrative - one page minimum
  2. Evidence of mathematics - two page minimum
- C. Reference page
- D. Presentation of research findings
  1. Poster display
  2. Videotape presentation

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Figure 2. Sample grading

Grading Rubric

| | | |
|---|---|---|
| _____ | 5 pts | Project Proposal |
| _____ | 10 pts | Quality of Presentation |
| _____ | 10 pts | Mathematical Content |
| _____ | 10 pts | Depth of Research |
| _____ | 15 pts | General |

list of suggested topics they were given.

First, the student was required to submit a proposal and outline for the project. The final project was due near the end of the semester and required both a written report and a presentation of the results. The written portion had to consist of a narrative explaining the topic and a mathematics section showing the equations and formulas used in the research. The results of the project had to be presented using either a poster board display or a video tape presentation. Students were encouraged to be thorough in the research for their project and creative in the presentation of their results. The students were required to show evidence of logical reasoning; mathematics had to be the focus of their project.

The results from the implementation of the long-term assignment have been exciting. Students completed an evaluation form about this new course requirement. One student wrote, "At first, it was just an assignment for class. But as I started doing the project, I became interested in what I was doing. It became important to me." Another student commented, "I have had a chance to experience something new without a teacher teaching it to me. I learned on my own." Students have come to their instructor's office to discuss ideas, rather than just personal difficulties and problems. Researching topics from counting the revolutions of a bicycle wheel to determine gear ratio, to investigating patterns and basic chaos theory, students have become excited about making connections between an academic subject and real life. Drawing from their own rich life experiences to do their projects, students have taught instructors about such diverse topics as quilting patterns and the Blackhawk helicopter. The long-term project has changed the students' focus in developmental math classes from being concerned only with getting the right answer to using mathematics as a powerful tool in everyday problem solving situations. Also, as a form of alternative assessment, this assignment alleviated some of the pressure from students who experience test anxiety.

Finally, these projects have enabled students to answer the persistent questions, "Why do I need to know this?" and "Where will I ever use this?" for themselves.

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# Educating Postsecondary Students with Learning Disabilities

*Linda Schnapp*

## Abstract

*This paper is intended for faculty and staff in higher education who work with students with learning disabilities. The issues to be discussed include defining and assessing learning disabilities, identifying specific curriculum strategies, determining reasonable accommodations, and improving faculty and staff attitudes toward the student with learning disabilities.*

By the late 1980s, two trends were apparent in the postsecondary education of students with learning disabilities. First, service providers in many colleges and universities were being inundated by the large number of learning disabled students requiring services. Second, a disproportionate number of students with learning disabilities were attending two-year colleges as compared to universities. As a result, personnel at the community colleges were frequently finding themselves confronting a large number of different issues in their attempts to meet the needs of postsecondary students with learning disabilities.

The issues that community college personnel have been dealing with since the 1980s are of various kinds. The first issue is related to the lack of clarity inherent in the label "learning disability." Although the term "learning disability" was first defined in 1963, educators today are still struggling to understand its meaning. In speaking about learning disabilities, Moats and Lyon (1993) state, "Even a cursory perusal of the literature...reveals that the field has been, and continues to be, beset by pervasive and, at times, contentious disagreements about definitions, diagnostic criteria, assessment practices..." (p. 282). Moreover, even students with learning disabilities frequently do not understand the nature of their disabilities. Many come to college without documentation or with documentation that does not clearly spell out the areas in which the student demonstrates specific processing difficulties. Because experience has taught students with learning disabilities to focus on their learning weaknesses, they frequently do not know their learning strengths. Such students often develop low self-concepts, causing them to experience an excessive degree of anxiety and depression (Huntington & Bender, 1993). Thus, they may demonstrate less motivation to succeed academically than students who do not have disabilities.

Second, some students with learning disabilities have difficulty in accepting their disability. They appear to either deny their disability or to be overconfident. This situation may be most commonly found among those students who have received a great deal of support from special education personnel while they were in high school (Mangrum & Strichart, 1984).

Third, like many freshmen, students with learning disabilities may not have developed the independence they need to adjust to college. They do not know how to self-identify, to seek out appropriate support services, or to identify suitable accommodations or modifications.

Fourth, many college students with learning disabilities lack the necessary academic preparation to succeed in college. Others have not developed the study skills required for success. For many, a decision will have to be made by those offering support at the college level as to whether the primary emphasis should be on the remediation of basic skills or on subject-matter tutoring (Adelman, O'Connell, Konrad, & Vogel, 1993).

Fifth, college students with learning disabilities often face the challenge of gaining and maintaining the acceptance and cooperation of academic faculty. Even those faculty members who support accommodations for students with sensory and physical disabilities may take a negative approach to accommodations for students with learning disabilities (Leyser, 1989; Minner & Prater, 1984).

Finally, postsecondary service providers must make sense of the variables requirements of Section 504 with regard to who qualifies as a handicapped person. The ambiguity of this law has resulted in confusion concerning the extent of the reasonable accommodations or modifications that must be made to serve individuals with disabilities.

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These issues present colleges and universities, particularly community colleges, with a significant ethical problem. Students pay their tuition assuming that they have the potential to succeed and to benefit from taking courses. Therefore, it is ethically imperative that the administrative staff and the faculty of the college enhance the likelihood of student success by accepting the challenges inherent in helping students deal with their disabilities. Specific steps may be taken to achieve this goal.

The first challenge to be met is the establishment of criteria for the identification of students with learning disabilities. Additional psychological evaluations may be required to determine which individuals are actually learning disabled and to identify the learning strengths and weaknesses of these students. Because standardized, reliable, and valid diagnostic instruments are scarce (Moats & Lyon, 1993), the diagnostician will have to be skillful in eliciting important qualitative information during the testing. Further information about the functioning level of the students may be gained from informal curriculum-based assessment practices (Warde & Bryant, 1993).

The next step is to use the information obtained from the assessment to help students with learning disabilities to plan their academic programs. Careful academic planning should be based on the advisor's knowledge and understanding of the subject of learning disabilities and of the specific student's strengths and weaknesses, processing deficits, and learning style. Course selection should also be based on information about the course itself. The following issues should be taken into consideration: (a) the way the course fits into the departmental sequence of courses; (b) the level of difficulty of the course; (c) the prerequisites or assumed background knowledge and skills of the course; and (d) the methods of instruction and evaluation. The student might be asked to read the course description and syllabus in advance and, whenever possible, to speak to the instructor personally about these issues as well as about the reading load, the course requirements, and the frequency and method of evaluation (Vogel, 1982).

Accommodations and modifications are offered to students with learning disabilities so that they will be able to learn and to demonstrate mastery of course material within the restraints imposed by their perceptual handicaps. Most students with learning disabilities need accommodations in at least one of four areas: reading, language, mathematics, and test-taking. Accommodations that could help students to minimize the impact of their deficits might include: (a) taped textbooks; (b) prehighlighted textbooks; (c) tape recorders to tape lectures; (d) untimed or extended time tests; and (e) a reader for objective exams. Students may not require the same accommodations in all courses.

Faculty members who are concerned about compromising the academic integrity of their courses may be less willing to provide accommodations or modifications. This issue may be dealt with by encouraging faculty members to become involved in the development, implementation, and evaluation of accommodations. Faculty members may be assured that they do not have to be overwhelmed by the presence of students with learning disabilities in the classroom; in many cases, they merely have to arrange for or to allow the accommodations needed by the student. When an instructor is not receptive to a student's needs, the student may require an advocate. Advisors can assist students in exploring instructor or course alternatives, but these are not always available or appropriate.

Another issue that arises is whether to spend tutorial sessions on basic skills instruction or subject specific tutoring. Since time is of the essence, one approach to this issue might be to integrate the two by using the student's coursework to help the student acquire skills. Students are most concerned with successfully completing class assignments; therefore, they are more motivated to work on material that is directly related to their classwork (Adelman, O'Connell, Konrad, & Vogel, 1993).

Although it will be a challenge for administrative staff and faculty to provide equal opportunities for college students with learning disabilities, the important point to remember is that they can succeed in college. Action must be taken today to actively address those issues in the field of postsecondary education that may be resolved, including issues of definition, assessment, and service delivery.

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# Integration of Basic Composition and Reading

*Caroline Stern*

## Abstract

*One way to better serve developmental students is to immerse them in a learning setting that academically integrates co-requisite but separate basic reading and writing classes. Students can learn to synthesize information across the curriculum when this process is modeled and reinforced by lesson plans and collaborative learning that blend basic writing and reading assignments.*

So much to do! So little time! What developmental educator has not looked at the profile of in-coming students and thought this? And with the pressures of shrinking budgets, looming outcomes assessment, and an increasingly academically at-risk student population, teachers have to be creative in their problem solving. Research has long proves the important connection between reading and writing skills, but have we made the most of that connection in the way we traditionally teach those two subjects in higher education?

At Ferris State University, we wanted to test whether we could improve the performance of our entering freshmen with low test scores and high school grade point averages by placing them in co-requisite, academically integrated basic reading and writing courses where each teacher taught her own class, but used cross-curricular strategies to immerse the student in material that flowed across the curriculum. Our goal was to teach students how to synthesize information from both subjects by modeling that process in our syllabi, lesson plans, and assessment instruments.

Previous to this, our basic writing classes had relied on self-reflective writing and personal narrative as a primary mode for teaching composition. We knew that the drawback to this is that professional and academic writing typically do not use this mode of development. But our developmental students could not write an informed response paper because most had trouble understanding the reading that could inform a response. Likewise, the reading teachers knew that written response improves reading ability, but it takes considerable time to teach and grade extended written response. Out of this mutual frustration, we decided to initiate a trial project involving the academic integration of one reading and one writing class.

We agreed to target a group of eighteen students who would use the same core reading material as the basis of instruction for their writing and reading classes. Students were enrolled in co-requisite, but separate reading and writing classes. To facilitate this, we had the summer orientation staff place an "entry by permit" designation on the sections to control enrollment. Students were willing to take the linked classes because they formed a neatly bundled, conveniently scheduled set of required classes. They also liked the idea of having to buy only one textbook for two classes. We used The Thoughtful Reader by Mary Fjeldstad (1994) as our shared text. This book worked better for the reading class than the writing class because it did not have extended writing assignments or sections on the writing process; however, it did have a thematic format that we used as an organizing element for the classes.

We laid the foundation for the classes by reaching agreement on core teaching and testing strategies, cognitive and affective learning goals, and student responsibility. We had the same attendance policy, used a shared writing portfolio, scheduled periodic

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individual conferences with students to discuss their progress, and employed collaborative groups as a teaching and learning method.

We followed this by creating syllabi and lesson plans organized around two week long thematic units allowing the reading class to cover a series of articles with short written responses. Simultaneously, the co-requisite writing class covered the same theme by guiding students through a single extended response to the readings in each unit.

This approach to reading created a unity so that students could compare how different authors approached the same general subject. In the writing class, the students were asked to write extended responses to the articles as a thematic unit. Because the reading teacher guided students through the readings, they gained a clearer understanding of the material that created a new resource for topic development in their essays. It was the first time some of these students were empowered to move beyond writing that was purely self-reflective to writing that was truly informed by a variety of authors.

Another benefit of the academic integration was that the reading class introduced and explained accessible reading models that students studied and could use to better understand the structure of an essay. Students studied , for example, professional models of introduction and conclusion strategies, development techniques, and thesis/topic sentence outlining at a level and intensity that would not be possible in a writing class. The writing class gave students the guided opportunity to make practical application of these lessons in their own compositions. What was taught in one class was directly reinforced and practiced in the other.

The academic integration also facilitated assignments like summary writing. Up to this time, summary writing had not been taught in most basic writing classes because it required too much class time devoted to identifying the main ideas in a reading. But with this type of preparation accomplished in the reading class, the writing teacher could easily require summary writing and use it to teach essay structure, development strategies, and logic.

If we expect students to synthesize information across the curriculum, it follows that classes that model and practice that synthesis for the students should be especially helpful. Using a writing portfolio allowed the students to make a visual connection between the two subjects. Students wrote journals in response to their reading assignments. They included their response to reading as prewriting and brainstorming material for their longer essays. Short reading responses were expanded and consolidated to create longer essays. Vocabulary tests became a type of thesaurus for their essays.

Another benefit of academic integration is the teacher conferencing opportunities. Because of our program's intrusive advising approach, teachers did not breach a student's privacy rights when they conference to gain a more complete picture of student performance, ability, and attitude. Teachers were empowered to be better advisors because they had more diagnostic information about each student. It was essential that the teachers made it clear to students that there was a shared philosophy in teaching as well as a dedication to the students' well being and development as educated people.

Teaching at-risk students is very demanding and the support network that can develop in a situation like this, especially in regards to specific challenging students, goes a long way toward preventing teacher burn-out. The integrated approach gave us added insight because we pooled our abilities and used each other's strengths to find the best in each student and in ourselves.

Because developmental students have so much to accomplish, it is important to protect them from burn-out also. The paired courses allowed the teachers to coordinate and monitor the work load for each class to more evenly distribute assignments so students worked at a steady, managed rate. Consistency in work load is not a mirror of typical college classes, but it was very beneficial to the developmental students because it lowered stress levels and allowed them to give more focused and balanced attention to their homework.

The academic integration also benefits students in the affective realm. The classes were scheduled consecutively in the same room, so we cut down on tardiness, at least in the second class. Both teachers used collaborative groups to build cohesion in the class. The test group was academically homogeneous, but socially diverse. Students had to learn to work with that diversity because for seven hours out of the week there was no escaping it. While some complained that they were not exposed to the full diversity of college life, others appreciated the more familiar environment that empowered them to express themselves in a group with which they were familiar. The camaraderie of the group lead to a stronger community of learners. They informally created a "buddy system"

that was more sophisticated than any we had seen in individual classes. Students were together enough to identify and employ the roles that each student best served. They formed study groups both formally in class and independently, thus providing guidance for one another by being back-up sources for doing homework. While students developed a more sophisticated network for learning, some also developed a more sophisticated network for cheating. This did not occur until late in the semester and assignments had to be adjusted to discourage this behavior.

Because we had an attendance policy that made it possible for students to fail the class before the end of the semester, we were concerned that we would have a student still enrolled in one class while having failed the other. This happened to two students. Failing one class and not attending it did put them at more risk of failing the second class, so in this sense the integration created a higher risk for students, but it also created a greater incentive for students to do well in both classes. We had a very low rate of students skipping one class and not the other.

Our statistics show for those students who stayed in both classes, there was a higher reward. The section of paired reading and writing showed lower drop and failure rates than the general population and a higher retention rate for the following semester. Our pilot project of just one group of eighteen students is too small to use as a basis for broader action, but this coming fall we will be testing this model of reading and writing academic integration on another group of students before expanding the model.

We did learn that for the teachers, "two heads were better than one." The success of this project, though on a small scale, has encouraged other teachers in our developmental classes to look for new ways to solve the problem of having so much to do and so little time.

# Activities to Promote Achievement among Mathematics Students

*Pamela V. Thomas • Jeanne L. Higbee*

## ABSTRACT

*Many varied activities were introduced into an academic assistance mathematics class by a team of two faculty members, the regular academic assistance mathematics teacher and a member of the division's counseling faculty. The purpose of these activities was to teach the students to work cooperatively, to be persistent, to build self-confidence, and to be successful in mathematics.*

College algebra courses are often the pivot point of the revolving door in colleges and universities. Developmental mathematics classes must prepare at-risk students to successfully complete required college algebra courses. During the 1993-94 academic year the Academic Assistance mathematics faculty at the University of Georgia developed a new two quarter sequence of mathematics for the students who had been identified through an admissions testing program as being at the highest risk. In the past these two quarters of mathematics covered two levels of algebra texts, the first quarter using an elementary algebra text and the second quarter an intermediate algebra text. This organizational structure had made it difficult to cover the more advanced topics of the intermediate text because the intermediate text began with many of the same concepts that were contained in the elementary text. Furthermore, students resented repeating the same content though presented in a slightly different way. The new two quarter sequence used the same intermediate text for both quarters but allowed more time to be spent on each topic. This arrangement allowed time for other activities to be incorporated into the course content.

In addition, a counselor joined the mathematics teacher one day per week to explore topics not usually addressed in math class. Initially this project was developed to reduce anxiety among the high risk students, but it was soon evident that there was a need to expand the breadth of the program. Some of the activities did focus on noncognitive variables related to success, such as relaxation exercises and systematic desensitization to reduce mathematics test anxiety. However, a greater emphasis was placed on activities designed to encourage collaborative learning. When students work together they gain insights that may have eluded them when working alone. The majority of these students prefer interactive learning to reading textbooks or listening to lectures. However, some of them became uneasy and somewhat unsure of themselves when the structure of the mathematics class was changed. For most of the students, the more familiar they became with the group activities the better they liked them. One of the objectives of these activities was to encourage the students to work cooperatively in their regular mathematics, not just for the special activities. By the end of the first quarter many of the students had become part of small groups that studied together on a regular basis. The collaborative approach has resulted in a better match between teaching and learning styles. Furthermore, students with low self-esteem tend to feel more comfortable working in pairs or small groups, rather then presenting their ideas before the entire class.

Additional activities were introduced that were designed to enhance critical thinking and problem solving skills. The faculty decided to include some probability problems because a number of the students in this math sequence will follow it directly with statistics, rather than college algebra. Again the work was done individually, in pairs, or in a small group. The students were encouraged to dissect problems

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and solve one part at a time. Instead of one big problem, which seemed too difficult, it was discovered that the problem was just a series of little parts that they could handle. With each success the students became more positive about their own capabilities and less negative about their ability to do mathematics. The greatest change in attitude could be seen in the solving of word problems. By the end of the course some of the students actually admitted that they could do word problems with more accuracy that many of the other topics.

During the second course the emphasis shifted to spatial visualization skills. A series of increasingly difficult spatial activities was introduced over a period of weeks. Individual students use different types of visual imagery in solving a variety of mathematical tasks. The objective was to prepare the students for activities that required these spatial visualization skills, especially graphing and concepts of symmetry.

The faculty used a wide variety of sources for the activities introduced on Fridays. Dell Math Puzzles and Logic Problems (1994) is a magazine published four times per year that provides many interesting types of problems to help students develop higher level thinking skills. Most editions also include a page of a series of problems that involve a combination of word problems, logic, and visualization. Dale Seymour has authored a number of useful materials, including Critical Thinking Activities (Seymour & Beardslee, 1988). Two sources of visually-oriented activities are Thinking Visually (McKim,1980) and Spatial Visualization (Winter, Lappan, Phillips, & Fitzgerald, 1986). In addition to the Dell magazine, sources of logic problems include Logic, Anyone? (Post & Eads, 1982) and 101 Puzzles in Thought and Logic (Wylie, 1957). The faculty used Probability (Phillips, Lappan, Winter, & Fitzgerald, 1986) as a source for activities to prepare students for statistics. Big Book of Games II (1988) is a source of a variety of types of activities. Additional group activities, such as a murder mystery exercise, have been pulled from counseling and group dynamics resources, including Reaching Out (Johnson, 1972) and Joining Together (Johnson & Johnson, 1975).

The activities introduced in this two course sequence have been so successful that the mathematics component is in the process of developing a course that would provide the opportunity for any student at the university to develop problem solving skills.

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# Developing Experiential Learning Assignments for Composition Courses

*Edna M. Troiano*

## ABSTRACT

*In order to meet the academic and professional needs of technological preparation (tech prep) students, working adult students, and traditional students intending to transfer to four year institutions, community colleges need to revise their traditional composition courses. This paper discusses writing in the work place and offers four nontraditional writing assignments.*

During the last decade, several school-to-work initiatives have developed, all designed to produce a better trained, better educated workforce while avoiding duplication of effort. Many community colleges have added coops, apprenticeships, and career academics. The initiative with the greatest impact on two year colleges, however, is the technological preparation (tech prep) program offered by many public schools. Tech prep programs typically combine four years of high school with a two year Associate of Arts (A.A.) degree or certificate at a community college.

The influx of tech prep students is a boon to community colleges, many of which have flat or declining enrollments; however, tech prep students from local public school systems may have significantly different educational experiences than college preparatory students. Tech prep students generally have more experience using computers, learning through varied technologies, learning through hands-on experience, and far more work based learning experience. They are also more accustomed to self-paced and collaborative learning; they may be less accustomed to reading extended printed texts, listening to lectures, taking notes, and writing essays or research papers, the traditional staples of academia. In addition to having different learning experiences and styles, tech prep students have different educational needs than traditional college students, since they intend to enter the work force in a technical field in two years.

## Writing Needs

In order to understand more clearly the future needs of tech prep students as well as the current needs of working adult students, five members of our department visited local work sites (two hospitals, a nuclear power plant, two military bases, the phone company, the electric company, and the police station) to talk with employers and employees about the writing skills and tasks crucial to their jobs.

## Desirable Employee Characteristics

Employers at all the work sites talked about the traits they need in their employees, as follows:

1. Life-long learners: Most sites we visited are changing at a dizzying pace. All employees will need on-going training throughout their careers.

2. Flexible workers: As agencies downsize, demands on workers to do tasks outside the traditional job description and area of expertise increase.

3. Collaborative workers: Collaboration was important at every work site.

4. Problem solvers: Workers must think both creatively and critically, be good negotiators, and keep calm under pressure.

5. Workers comfortable with technology: Emerging technologies affected all work sites, and employers expressed impatience with employees reluctant to adapt to change.

## Academic Versus Professional Writing

When we asked employers and employees about the writing they did and what preparation they thought col-

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leges should provide, we gained some interesting insights. The director of communications at one work-site, also a former student of ours, pointed out the ironic contrast between academic and professional writing. Her professors always insisted that she expand on her ideas, adding evidence and examples; her employers always insisted that she produce the most concise text possible. She had, in fact, recently been asked to revise the company mission statement, reducing it to a paragraph that would fit on a coffee mug. There were two lessons here: the importance of being concise, which we heard repeatedly, and the emergence of nontraditional texts (coffee mugs, in this instance).

Another communications director said that when college students lack factual information or are uncertain, they are encouraged to speculate and to make "educated guesses." For him, one of the difficult yet necessary retrainings is teaching employees to say, "I don't know." He also stressed the importance of writing texts that are brief, complete, and unambiguous. He feels that status in a company is now gained by the most succinct, not the longest, reports. Efficiency of communication seems to be the new focus.

## Use of Technology

Supervisors everywhere stressed using available technology to communicate, including e-mail, electronic information sources, and graphics packages. They were equally adamant about focusing clearly on the client in all communications.

As a result of our work site visits, we decided to revise our developmental and freshman composition courses to insure that the courses would equally serve our students who will transfer to four year institutions, our tech prep students, and our working adult students. Each of these groups constitutes about one third of our student population, so meeting the needs of all three groups is essential.

Our work site visits reinforced our belief that we must provide students with ample opportunities to use computers for writing. We have taught some composition courses in computer labs for almost a decade. However, after our visits, we decided to (a) adopt a networked wordprocessing package, so students can electronically confer with their professor or peers and receive and submit assignments electronically, (b) develop assignment disks for students in traditional classrooms to use in open labs, and (c) add a graphics package to labs so students can make electronic presentations.

## Writing Assignments

We also developed several new assignments that would foster both the traits and the writing skills employers sought. All four of the following assignments are collaborative, not because we believe all college writing should be collaborative, but because we already have numerous individual assignments.

### Policy Statement

Goals of this assignment are to help students write clearly, succinctly, and completely; to encourage collaboration and negotiation; to foster problem solving; and to foster accountability.

At the beginning of the semester, choose a policy from the syllabus (e.g., attendance). Discuss some of the ramifications of the issue and explain how you arrived at your policy. Ask students to work in small groups to draft a clear policy for the class. After discussing each policy, the class must choose the policy they wish to use. That policy then becomes an addendum to the syllabus, and students must abide by it. At the end of the semester, students should revisit their decision and make recommendations for future semesters.

### Mission Statement

This assignment helps students synthesize information; practice writing summaries; and foster collaboration.

Provide sample mission statements from the college or department or ask working students to bring samples to class. Review the samples and other relevant documents (e.g., department course masters, the textbook, the syllabus). Working in groups, students write a brief paper that clearly states the mission of their composition course. Students should reevaluate their mission statement at the end of the semester.

### Process Paper

Goals of this assignment include analyzing audience needs; altering style, content, and format to meet audience needs; and incorporating graphics with text.

Working in small groups, students analyze a process. They then present the process in one of these three forms: (a) a brochure that contains text and graphics, suitable for someone who will use the process, (b) a feature for a local paper, usually containing a human interest focus and quotations, or (c) a traditional college essay. The class then compares the documents and analyzes the ways in which changes in purpose and audience affect the text.

### Definition Paper

The goals of this assignment are to define terms clearly; to practice problem solving; to organize sequences; to participate actively in the learning process; and to work collaboratively.

Working in small groups, students develop a guide to finding and correcting fragments and run on sentences. The guide must include a clear definition of a correct sentence, a run on sentence, and a sentence fragment. Students should then use their guide when editing subsequent papers.

These assignments assist all students in preparing for their futures in the world of work, regardless of their current status or academic preparation.

# Supplemental Instruction's Impact on Affect: A Follow-up and Expansion

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## Abstract

*We investigated the relationship between the participation levels of college students in three classes hosting Supplemental Instruction and the affective variables locus of control, self-efficacy, and self-esteem. Though many findings did not reach statistical significance, we found several trends. We did find that demographic variables were significantly related to participation level.*

Following up a previous study (Visor, Johnson, & Cole, 1992), we sought to determine whether positive change in certain affective variables was associated with participation in Supplemental Instruction (SI), especially with regard to college freshmen. These affective variables are locus of control, the feeling of being in charge of one's own destiny; self-esteem, beliefs about one's worth as a person; and self-efficacy, beliefs about one's ability to succeed at a given task. The findings of this study, because of more complex analysis than had been employed in the previous study, turned up curious confounds.

We pretested all students in an auditorium section of an introductory psychology course and two auditorium sections of an introductory economics course during the first week of the 1994 fall semester and posttested them during the last week of classes. To allow comparison of results, we measured the affective variables using the same questionnaires used in the previous study: Rotter's (1976) Internal-External Control Scale for locus of control, the Self-efficacy Scale (Sherer, et al., 1987), and Hudson's (1987) Index of Self-esteem.

## Hypotheses

We generated hypotheses for freshmen and upperclassmen regarding the relationship between level of participation in SI and (a) initial affective characteristics and (b) changes in affective characteristics over the course of the semester. We derived three categories of participation: regular participants, occasional participants, and nonparticipants. Regular participants are students who attended four or more SI sessions during the term. Occasional participants are students who attended one to three SI sessions. Nonparticipants are students who did not attend any SI sessions.

Among both freshmen and upperclassmen we expected regular participants to: (a) exhibit a greater internal locus of control, higher self-esteem, and greater self-efficacy than nonparticipants and occasional participants; (b) experience a greater decrease in self-esteem and self-efficacy than nonparticipants and occasional participants; and (c) experience no change in locus of control compared to nonparticipants and occasional participants. Among upperclassmen, we expected that regular participants would not experience a decrease in self-esteem and self-efficacy compared to nonparticipants.

## Findings

Data did not support our hypotheses regarding the initial levels of affect. Nevertheless, we did find differences, which we call trends, consistent with the hypotheses. Among freshmen, regular participants tended to have (a) higher self-esteem than nonparticipants, (b) greater self-efficacy than nonparticipants, and (c) greater internal locus of control than nonparticipants and occasional participants. Among upperclassmen, regular participants tended to have (a) higher self-esteem, (b) greater self-efficacy, and (c) greater internal locus of control than nonparticipants and occasional participants.

We found significant results for only two hypotheses regarding change in affective characteristics during the semester. Among freshmen, regular participants, as hypoth-

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esized, did not experience any statistically significant changes in locus of control relative to nonparticipants and occasional participants. Also as expected, regular upperclassmen participants did not experience a statistically significant change in self-efficacy relative to nonparticipants and occasional participants. We found trends regarding changes in self-esteem among freshmen and upperclassmen that were consistent with our hypotheses, but these findings were not statistically significant.

Surprisingly, preliminary analyses revealed that students' participation level was significantly related to gender, racial and ethnic background, composite admissions test score, and high school percentile rank. These demographic variables represent non-random self-selection of students into SI, therefore functioning as confounds that prevent us from identifying a causal relationship between participation in SI and changes in affect.

## Questions for Further Study

More than giving solutions, this study raised additional questions:

1. Should we be examining a relationship between affect and SI at all? After all, though it is important, affect, by its very nature, is very difficult to study. Our answer to this question, of course, is yes! In both studies, we found trends, trends that we can believe in. In continued research we must look at why we found little significance.

2. Are locus of control, self-efficacy, and self-esteem the affective variables we should be examining? When we first began to study affect, we thought that locus of control, self-efficacy, and self-esteem were the most relevant affective variables related to SI. Both these variables and SI have been recognized as influencing achievement leading to persistence in higher education, so we want to continue to study them.

3. What are the relationships of the significant demographic confounds to our study? We will be analyzing that question in our follow-up study.

4. Based on objections best presented by Alfie Kohn (1994), should we be analyzing these affective variables in specific contexts instead of more global contexts? That is, is "academic" affect different from affect in non-academic areas? Should we be asking whether self-efficacy in a psychology course is different from self-efficacy in a microeconomics course? And is it different in different courses for the same student? What about self-esteem and locus of control? How are they different in different venues? We have the means to examine the two courses in our study separately, which we will do in follow-up research. Also, we have studied only courses in the general education curriculum at our institution. Would these affective variables look different in courses for majors?

## Implications for Practice

What impact do any of these results have on the way SI is practiced? SI strives to get students to see a relationship between participating regularly in SI and earning higher course grades. Thus, program administrators want students to return to SI sessions. If students who have a more internal locus of control achieve greater self-efficacy in the SI session and, as a result, on the class tests, they would be more likely to return to SI sessions. If they achieve greater self-esteem that they attribute to SI, it is also more likely that they would return.

If there are affective changes associated with being freshmen or upperclassmen, what will that mean for the level of courses offering SI? After analysis, if we find that there are affective changes associated with specific disciplines or courses for a given student, what will that mean for SI program administrators? What are the implications for SI design? That is, given the forthcoming information, should SI supervisors and leaders be trained to know more about affect and how to engender positive change during SI sessions?

The demographic data to be analyzed in the follow-up study will provide a more complex view of who regularly and occasionally participates in SI and who does not. Participation groupings may have implications for how SI personnel market SI both to students and administrators.

We are really at the beginning of research in this domain. A previous study showed that students who regularly participated in SI have persisted in college better than the nonparticipants, but we are still looking for all the reasons. We are looking for colleagues who can help us generate useful hypotheses, colleagues who can help us interpret the results, colleagues who can replicate this study on their campuses, colleagues who can extend this research.

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# Mathematics Survival: A Linked Course

Gideon L. Weinstein

## ABSTRACT

*One of the services provided by our Learning Center to students attending our University is a credit bearing course on Learning Strategies for Mathematics. It is offered to any student concurrently enrolled in the introductory Finite Mathematics lecture course This paper will discuss the content and results of the course.*

In 1989, the Student Academic Center began to offer a course linked to Finite Mathematics that had been developed by the Linked Course Coordinator for the Student Academic Center and the Basic Skills Course Coordinator for the Mathematics Department. The course has been continuously revised by them and the various graduate student associate instructors who have taught the course over the years.

## The Content Course

Finite Mathematics is a required course for a variety of non-math majors. Students with a wide range of mathematical aptitudes, skills, and attitudes take Finite Mathematics, and many of them have difficulty succeeding. Several years ago a local study of grade inflation found that Finite Mathematics had the lowest awarded grade point average of any class on campus. A large majority of the students enroll in Finite Mathematics are freshmen who attending lectures in halls seating either 250 or 80 people. Many students have difficulty adapting to this new learning environment and the high demands of the course. Not only is the environment strange, but Finite Mathematics enjoys a unique position in the college preparatory and early college mathematics curriculum in that it is outside the standard Algebra-Trigonometry-Calculus sequence that most students spend several years completing. However, this newness works to our learning center's advantage. It allows a fresh start for students disenchanted with their previous mathematics experiences. We try to capitalize on the students' willingness to be open-minded when it comes to learning mathematics by incorporating many activities for reading, writing, and communicating mathematics that are foreign to most of our students' experiences.

## The Survival Course

The survival course carries two elective credits, meets two and a half hours per week, and is open to students concurrently enrolled in any section of Finite Mathematics. A student who withdraws from the content course must also withdraw from the survival course. The academic advisors are asked to suggest this class to students who wish to take Finite Mathematics but have Math Scholastic Aptitude Test (SAT) scores usually around 100 points below 530, the average for the class. Other criteria for recommendation to the course are having previously failed or withdrawn from a math course; having not taken a math course for the last year or more; perceiving oneself as having math anxiety; or fearing Finite Mathematics because of its reputation.

The activities and assignments in the course are organized around two goals and three themes:

### Goals

1. To introduce and reinforce active studying, learning, and reading strategies.

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2. To empower students to apply these strategies to the math course content while receiving feedback as to the quality and effectiveness of their work.

### Themes

1. To understand mathematics material through active reading, critical thinking, conceptual exploration, self-monitoring and questioning, and organized problem-solving techniques.

2. To communicate mathematics material through writing, concept mapping, oral presentations, group projects, consensus building, and note taking.

3. To be aware of the effects of attitudes and beliefs about mathematics on behavior and performance in mathematics.

These goals and themes are achieved through a variety of class assignments.

### Finite Mathematics Homework

Finite Mathematics homework for this class is collected in our course and includes creating extra material to aid learning and studying. Supplementary work includes such items as creating key concept cards, writing step-by-step descriptions of problem solving, creating concept/semantic/mind maps, and making summaries of book sections. Homework is reviewed and graded by peers to provide greater exposure to different ways of approaching and doing mathematics.

### Group Oral Presentations

Each week a small group meets and presents to the class a review of important parts of the Finite Mathematics textbook sections that have been covered recently in lecture. Students are expected to meet several times as a group in preparation for the presentation. Presenters answer questions from their classmates and interactively engage the learners in solving math problems, asking and answering questions, defining math terms, and other similar tasks. Presenters are guides and facilitators. The emphasis is on engaging the participation of the learners and communicating the mathematics in common language instead of speaking over the heads of the audience, as many lecture hall instructors do.

### Finite Mathematics Exam Preparation Projects

Students work in groups to create a multiple choice quiz, complete with explanations of why the correct answer is right and the incorrect answers are wrong. These projects help to prevent students from choosing "foils" on the multiple choice departmental midterm and final exams. The quiz is distributed to the rest of the class so it can be used by all as practice for the exams. Additionally, students learn valuable test-taking skills by going through practice exams and identifying the strategy or procedure that is appropriate for each question, without actually doing the problem. This helps alleviate the common complaint that "The material looked like I'd never seen it before!"

### Article Analysis Assignment

Each student is required to write a three to five page paper pertaining to a topic from one of various articles on reserve in the library. The topics all relate to the studying, learning, and teaching of math, and the student chooses the article of greatest interest to them.

### Survival Course Exams

Students are expected to apply a variety of strategies to a section of a math textbook, which includes taking notes from a videotaped lecture and annotating the textbook pages, as well as taking a quiz over the material just covered to determine how effective their application of learning strategies has been. Students also engage in writing about and doing some math problem solving activities. In addition, students respond with solutions to scenarios describing difficulties experienced by students in math lecture classes. The final exam also requires students to engage in a very complete self-assessment of changes in their behaviors as students of math. Students must consider the work they have done for the content and the survival course and synthesize references and information they have gleaned from their work to support their conclusions concerning their behavioral changes (partly as measured by surveys taken at the beginning and end of the class).

### Electronic Mail (E-mail) Assignments

Students have to learn how to use computer mail for sending assignments to the instructor and to other students. E-mail is used as another domain in which students can practice communication of mathematics. Examples of some assignments are formulation of questions about material from the math textbook, and sending questions to the students doing the group oral presentations that week.

### Other Class Requirements

The exact implementation of this portion of the course varies from instructor to instructor and semester to semester, but some possibilities are listed below.

1. Learning Strategies: Each student is expected to apply various studying, learning, and textbook reading strategies. As the semester progresses, students are asked to evaluate the strategies in terms of their own personal usefulness. The student becomes actively involved in a systematic approach to reading and studying mathematics.

2. Lecture Note taking: Note taking methods other than "copy it all down" are discussed in class. Students are required to follow different systems of taking notes and then synthesize the different methods into a style that best meshes with their learning style.

3. Peer Math Problem Solving Groups: Periodically, math problem solving group meeting times are scheduled outside of class. These learning group meetings are facilitated by the instructor or an undergraduate peer teaching intern in order to foster development of stronger math problem solving skills.

4. Time Management: The student may be expected to complete several exercises concerning time management and possibly use a computer software program on time management available at the Student Academic Center.

## Results

In order to judge the efficacy of the survival course, students from the survival course and students enrolled only in Finite Mathematics (matched in scores on standardized math tests) were compared by their grades in Finite Mathematics. Records for fall term for 1989 through 1993 indicate that the students enrolled in the survival course consistently earn more As and Bs and fewer Ds and Fs. Although the findings for each year are not all statistically significant, they are encouraging. Hopefully, longitudinal and/or qualitative studies of the students will provide a fuller picture of the usefulness of the survival course.

# Connecting Mathematics to the Student's World: A Writing Assignment

*Annette C. Williams*

## Abstract

*Many developmental studies students in mathematics classes believe that they will never use the mathematics that they are asked to learn. A writing assignment that involves interviewing a professor in the student's major area is an effective way to convince the student that mathematics is necessary and useful.*

Typical developmental studies students must often be convinced that they need to study mathematics, particularly algebra. Every developmental mathematics teacher has heard students complain, "Where am I ever going to use this stuff?" The answer to this question is, of course, different for every student. Through a writing assignment specifically focused on this topic, students can find out some of the specific uses of mathematics in their own major area.

Students in three of my classes of developmental algebra wrote papers on how mathematics is used in their chosen fields. They interviewed a faculty member in their major area as a part of their research. One interesting observation is that not one student voiced opposition to writing a paper in a mathematics class, perhaps because they perceived this as an easy way to earn points in a mathematics course. Another observation is that only one professor of all those who were interviewed told a student that algebra would not be used in her career. This comment came from an elementary education professor who perhaps did not consider the great part that elementary school teachers play in preparing students for later mathematics classes, including teaching basic algebraic concepts. Aerospace majors discovered how important formulas can be when flight panel instruments fail. Theater majors learned about the engineering involved in figuring sound and light calculations. Recording industry majors learned of the algebra involved in calculating record contracts. Agriculture majors discovered formulas for mixing feeds, for computing soil erosion, and mixing various pesticides and herbicides.

As an instructor I benefited in several ways from this assignment. I learned more about my students; I could relate to them as individuals because I knew more about their interests. I learned many ways to relate the material that I teach to the course work and careers of the students. This assignment provided me with a wealth of information to answer questions of relevance.

In another assignment that I have used with my classes for four semesters, I asked students to write about applications of mathematics, particularly algebra and geometry, that they had used in non-mathematics classes or in their jobs. They were instructed to explain each example in enough detail for me to understand the application. Students turned in many examples that were beyond the experiences of most math teachers. There were examples of mathematics in military manuals, aerobics instruction, aerospace, anatomy, agriculture, homemaking, truck loading, building, interior design, stage management, nursing, economics, and business. I received large amounts of information that I now use to enrich my courses.

I graded these assignments primarily on content and adherence to the rules of the assignment; I did not intend to try to be an English instructor. For a mathematics teacher, just taking the plunge and assigning a paper in a mathematics class may be the hardest part of the process (Sterrett, 1992). Students should be

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shown an example of what is expected of them and encouraged to give proper credit to their sources.

Developmental students need to see relevance in what they are asked to learn. By writing about their major areas of interest and by interviewing professors, my students learned how they would use their math skills. The examples of mathematics used in other courses have enriched my teaching by inserting that crucial element of pertinence.

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